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Effect of Aromatherapy Massage with Mint Essential Oil on Physiological Parameters of Concussion Patients Hospitalized in Intensive Care Unit: A clinical trial

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ABSTRACT

Concussion patients are hemodynamically instable due to damage to the brainstem and the stresses experienced by patients in intensive care units (ICUs). Hemodynamic instability deteriorates awareness and declines consciousness in these patients. Alternative medical therapies such as massage and aromatherapy are used as new therapies with very few side effects in order to treat these patients. The present study aimed to evaluate the effects of aromatherapy massage with mint essential oil on physiological parameters of concussion patients hospitalized in the ICU. This was a semi-experimental study. The statistical sample consisted of 38 concussion patients hospitalized in the ICU. Eligible individuals were selected using targeted sampling method. The selected individuals were randomly divided into two groups (experimental and control). In the experimental group, the patients underwent 20 minutes of massages on hands and feet with 4% diluted mint and sweet almond essential oils for three consecutive days. Non-response overview scale (FOUR) was used to measure the level of awareness. Furthermore, physiological parameters were measured using monitoring devices. The results showed that the intervention significantly decreased vital signs of the patients in the experimental group (systolic and diastolic blood pressures and pulse rate every three days; rates of respiration on the third day and arterial blood oxygen saturation% on the second day) ($P < 0.05$). The two groups were compared using independent t-test. Physiological parameters were significantly reduced in three days in the experimental group compared to control. Aromatherapy massage with mint oil regulated vital signs more effectively than aromatherapy massage with almond oil in concussion patients hospitalized in the ICU. However, further interventions are required to use this technique for clinical practice.

INTRODUCTION

Traumatic brain injuries (concussions) cause problematic damages to the brain and change physical, intellectual, emotional, social and occupational parameters in the affected individuals [1]. The World Health Organization predicted thatthe prevalence of concussions will surpass the incident of most other diseases by 2020. Concussion is discussed as a major cause of death and disability[2].

Recent advances in medical and health care services for concussion patients have reduced mortality rates. However, these advances do not ensure full recovery of the patients. Most of these patients deal with many difficulties in regaining consciousness and improving cognitive physical and mental functions. This leads to long-term

hospitalization in ICUs[3]. Hospitalization in the ICU is a stressful event for the patients. They deal with many post-hospitalization stressors in the ICUs for many reasons such as fear of an unknown environment, permanent noise from monitoring devices, 24-hour artificial lighting, absence of meaningful stimuli such as touch and pain, discomfort caused by disease and trauma, anxiety, intubation and concussion-induced physiological disorders [4]. It is estimated that 30% to 70% of the hospitalized patients in ICU experience severe psychological stress [5]. On the other hand, concussion can affect brainstem function. As a result, the patient may suffer from heart rate irregularities, either increase or decrease in heart rates. Brain injury also either increases or decreases blood pressure. For this purpose, vital signs should be periodically checked at regular intervals to monitor intracranial status[6].

In fact, the aim of all treatments for concussion patients lies in maintaining normal brain homeostasis and preventing secondary brain injury. Currently, tranquilizers and painkillers are widely used in order to control stress of the patients in the ICUs. These drugs are expensive and associated with many side effects. Some studies have shown that continuous intake of sedative drugs delays separating patients from mechanical ventilation, which increases the cost of intensive care services[7]. Nonpharmacological interventions have fewer side effects, are safer and less aggressive compared with pharmacological treatment[8]. Currently, these interventions are widely preferred among clinical nurses[9]. Aromatherapy is an example of these interventions. This therapy is defined as using herbal oils (aromatic essential oils) for therapeutic purposes[10]. Aromatic essential oils are extracted from plants by distillation[11]. This therapy is administered in different ways such as inhalation and massage[12]. Aromatherapy is based on the theory that inhaling or absorbing essential oil can stimulate the limbic system and produce neural, hormonal and immune response. This therapy also affects heart rate, blood pressure, respiration, brain wave activity and release of various hormones in the body[13]. Aromatherapy and massage in the ICUs suitably increase the quality of sensory data delivered to the patients and reduce anxiety and stress[14]. Tactile stimulation is one of the most important and useful stimuli that can facilitate the patient-nurse therapeutic relationship by physical manipulation of the patients' body in contrast to aggressive manipulation frequently done in the ICU. This also promotes patients' trust and effectively strengthens patient-nurse relationships[15]. Mint is an herb whose essential oil is used in aromatherapy. This medicinal plant has a wide range of properties such as analgesic, anxiolytic, antispasmodic, anti-inflammatory, antioxidant, muscle relaxant and vasodilator. This herb can reduce pulse rate and blood pressure and regulate heart rate[16-19].

Although various studies have investigated aromatherapy, limited studies have addressed problems of the patients hospitalized in the ICU. These limited studies also delivered confounding results. Gimel Little (2014) showed that aromatherapy has no impact on the patient's vital signs in the ICU[20]. Stevenson (1994) also showed that aromatherapy massage has no considerable effect on physiological parameters except reducing respiratory rate immediately after the intervention[21]. Don (1995) also showed that aromatherapy massage on foot usinglavender has considerable effect on the level of anxiety, mood and physiological parameters in the patients hospitalized in the ICU. However, these effects were not persistent[14]. Therefore, this study aimed to determine the effects of aromatherapy massage with mint oil on the level of alertness and physiological parameters of concussion patients.

MATERIALS AND METHODS

This was a semi-experimental study conducted on38 concussion patients hospitalized in the ICU in 2016. Targeted sampling method was used to select eligible individuals from concussion patients hospitalized in the ICU by taking into account inclusive and exclusive criteria. Inclusion criteria were8 to 12 level of consciousness, less than six-month and more than 48-hour hospitalization based on non-response overview scale (FOUR), minimum age of 20 and maximum age of 40, no history of chronic disease (diabetes, cardiovascular disease, epilepsy and renal disease) and endocrine disorders (Cushing's syndrome and hypo/hyperthyroid), no history of sensory-nervous disorders, coma or previous head injury, no evidence of increased intracranial pressure (ICP) and symptoms of fat embolism, no evidence of drug addiction and absence of ulcers, inflammation, infection, skin diseases and fractures in the areas undergoing massage.

The required data was collected using a demographic questionnaire, clinical status assessment, registration forms of physiological parameters, consciousness level assessment based on FOUR Scale and biophysiological tools (monitoring devices). Content validity was used to evaluate validity of the demographic questionnaire, clinical status assessment forms and physiological parameter forms. For this purpose, these forms were distributed among several professors. Their amendment was applied to the forms. Physiological parameters were measured via patient monitoring devices. The device was calibrated with a standard mercury sphygmomanometer prior to intervention at every stage. Pulse rates of the device were measured simultaneously with the pulse rates measured by the author. The measured pulse rates were compared and matched with pulse oximetry. Respiratory rates were also measured and recorded by two individuals (the author and author assistant) simultaneously. Level of consciousness in the patients was assessed using a four-component non-response overview scale (FOUR). FOUR scoring scale is a

standard tool with four components including ocular response, motor response, brainstem reflexes and respiration. Every four component has four scores. In total, the scores range from 0 to 16. This scale shows an overview of non-responsiveness rating with higher than average precise assessment for comatose patients, intubated patients and the patients who cannot speak. Reliability and validity of this scale were confirmed in different studies[8, 21-23]. Mohammadi *et al.* assessed reliability of this scale regarding intra-rater agreement and inter-rater agreement. Coefficients of agreement were respectively obtained as 0.94 (intra-rater) and 0.96(inter-rater)[11].

The selected individuals were randomly assigned to control and experimental groups with regard to alternatively matched groups (19 patients in the intervention group and 19 patients in the control group). Then, demographic and disease-related forms were filled out using patients' records and their families. Environment of the study was matched for both groups. Then, the author visited the patients and explained research objectives and intervention procedure.

Prior to intervention, the forms of physiological parameters (including blood pressure, arterial blood oxygen saturation%, heart rate and respiratory rate) were completed. Intervention was applied to the experimental group as aromatherapy massage with mint oil. The control group underwent normal massage. Skin test reactivity to allergens was administered on both groups prior to aromatherapy massage with mint to ensure absence of skin sensitivity to various allergens. Hands and feet were massaged with 4% diluted mint oil and sweet almond oil for 20 minutes. Intervention lasted for 20 minutes for three consecutive days (10-minute hand massage and 10-minute foot massage). Prior to intervention, the author warmed up his hands. Then, he spread4% diluted mint oil and sweet almond oil on his hands. Then, he rubbed the patients' hands from wrist to fingers and feet from ankles to toes with stroking movements. The massage was carried out as pressuring with the entire palm. At the first stage of foot massage, each groove between the tendons that connects the ankle to toes was slightly pressured using the thumb or another finger. At the second stage, the foot and heels were massaged. At the third stage, the toes were separately pulled back and front. At the fourth stage, the thumb and another finger of the masseur were slipped on toes on outward direction (from the base to tip of the toes). Hand massage was also performed on both palm and back of the hand. At the first stage, effleurage and short movements from wrist to fingertips were performed with a direct pressure and moderate intensity. At the second stage, semi-circular stretching from center of the hand to the surrounding area was performed with a moderate pressure. At the third stage, small circular movements around the hand were performed with a gentle pressure. Then, the palm was massaged. Nonaromatic oil massage was performed in the control group using the same techniques and procedures carried out in the intervention group. It should be noted that right hand and foot were massaged before left right and foot. Information on the level of consciousness and physiological parameters were recorded five minutes after the intervention and every hour for four hours after the intervention. The above process was repeated for three consecutive days in each group. The collected data was analyzed using SPSS.

RESULTS

The results showed that mean age of the individuals in the experimental group was 26 (6.62) and 25.75 (6.95) in the control group. The patients were between 18 and 40 years old. Most patients were males (73.7% in the control group and 78.9% in the experimental group). Moreover, 47.7% were married and 52.6% were single in the experimental group. Furthermore, 26.3% were single and 73.7% were married in the control. The chi-square test results showed no statistically significant difference between concussion patients in the intervention and control groups in terms of gender, marital status and cause of hospitalization ($P > 0.05$). The Mann - Whitney test results also showed no significant difference between the two groups in terms of age ($P > 0.05$) (Table 1).

Table 1 - Descriptive information on the two groups (intervention and control)

Variable	Experimental group		Control		Significance level
	Mean (standard deviation)	Number	Mean (standard deviation)	Number	
Age	26 (6.62)	38	25.57 (6.95)	38	0.598
	Number	Percent	Number	Percent	Significance level
Gender					
Female	5	26.3%	4	21.1%	0.5
Male	14	73.7%	15	78.9%	
Marital status					
Single	10	52.6%	5	26.3%	
Married	9	47.7%	14	73.7%	0.184
Cause of hospitalization					
Accidental	14	73.7%	14	73.7%	0.613
Fall from height	2	10.5%	4	21.1%	
Beating	1	5.3%	1	5.3%	
Sport	2	10.5%	0	0%	

Paired t-test results in the intervention group showed statistically significant differences between mean systolic and diastolic blood pressures and pulse rates in these patients on the second day compared with the first day and on the third day compared with the second day. There was also no statistically significant difference between mean respiratory rates of the patients in the intervention group on the first and the second days(p = 0.127). But this difference was significant on the second and third days (p = 0.009). The Wilcoxon test results showed a statistically significant difference between mean arterial blood oxygen saturation% in the intervention group on the first and the second days(p =0.002). But this difference was not significant on the second and third days (p =0.348).

Paired t-test results showed no statistically significant difference between mean systolic blood pressures at any stage of the study in the control group. No significant difference was also observed between mean pulse rates of the patients at all three days in the control group. However, a significant difference was found between mean diastolic blood pressures on the first and second days (p = 0.047). This difference was not significant on the second and the third days (p = 0.541). Mean respiratory rates of the patients were not significantly reduced on the first and the second days (p =0.326). But this reduction was significant on the third day compared with the second day (p = 0.026).

Independent t-test results showed that mean systolic and diastolic blood pressures and respiratory rates were significantly reduced at three stages of the study in the experimental group compared to the control group. However, these relationships were not significant prior to intervention. Nevertheless, no significant difference was found between variables of pulse rates and oxygen saturation% between the two intervention and control groups (Table 2).

Table 2 –Mean comparison of physiological parameters and level of consciousness in both intervention and control groups after the intervention

Variable	Mean (95% confidence interval)		Standard error	F-value	Degree of freedom	Difference in 95% confidence intervals		Significance level
	Control	intervention				Upper bound	Lower bound	
Diastolic blood pressure (Mm Hg)	84 (81.25; 86.74)	78.74 (75.99; 81.48)	1.91	7.55	1.36	1.38	-9.14	0.009
Systolic blood pressure (Mm Hg)	132.38 (127.74; 137.03)	124.78 (120.14; 129.53)	3.24	5.50	1.36	-1.032	-14.17	0.025
Pulse rate (no/min)	89.91 (84.10; 95.73)	83.73 (77.91; 89.54)	4.05	2.32	1.36	2.03	-14.4	0.136
Respiration (no/min)	21.28 (20.23; 22.34)	15.88 (14.82; 16.93)	0.73	53.95	1.36	-3.91	-6.89	0.001>
Arterial oxygen saturation (%)	98.83 (98.47; 99.18)	99.22 (98.87; 99.58)	0.24	2.55	1.36	0.90	-10	0.119

DISCUSSION

The results showed that aromatherapy massage with mint oil considerably reduces mean systolic and diastolic blood pressures, pulse rates and respiratory rates and increases arterial oxygen saturation% in the studied patients. A study was conducted on 12 healthy student in which oral intake of mint significantly reduced blood pressure and heart rate[16]. In another study, effect of oral intake of mint on physiological parameters was evaluated in young and healthy individuals. In the former study, heart rates, blood pressure and respiratory rates were significantly lower in the intervention group compared to the control group [17]. Rezai *et al.* (2014) used mint inhalation as a therapeutic method. It was found that mint fragrance has no effect on blood pressure and heart rate[13]. Radenbash conducted another study in 2001 and showed that inhalation of mint has no effect on heart rate and systolic and diastolic blood pressures[24]. Pournemati (2008) reported that mint fragrance has no effect on many physiological parameters such as heart rate among female athletes [25].

One reason for the difference between these confounding results may be due to the amount and method of intake of mint. Memarbashi believed that inhalation of mint through the nose has no effect on blood pressure, pulse and respiratory rates. However, oral administration of mint declines blood pressure through reducing vascular tonicity[17].

Findings of the study in the control group also showed that massage has no effect on systolic blood pressure and pulse rate. Consistent with the results of this study, Hatan *et al.* showed that foot massage has no effect on any physiological parameter[26]. Lee and Balik (2002) pointed out that massage can reduce blood pressure [26].

Ebadi (2015) reported that total body massage has decreased systolic blood pressure in the patients hospitalized in ICU. The results of the former study are not consistent with the results of this study. This may be typically due to difference between the areas undergoing massage. In this study, the massage was limited to hand and foot. On the other hand, Ebadi *et al.* used massage on the entire body. They also showed that massage has no effect on pulse rate[27]. These results are consistent with the results of this study. Josie (2009) showed that massage therapy significantly reduced systolic blood pressure in stroke patients[28]. These findings are not consistent with the findings of this study in terms of systolic blood pressure. Josie used massage for back, hand and foot seven times a day for one week. Hence, these confounding results may be typically due to frequency of massage and the areas undergoing massage. A wider area of the body was massaged more frequently in the study conducted by Josie.

The results also showed a significant difference between diastolic blood pressures on the first and the second days in the control group. Mean respiratory rates were significantly reduced on the third day of intervention. Arterial oxygen saturation% was significantly increased on the second day of intervention. These findings are consistent with the results of the studies conducted by Haji Hosseini[29], Sutherland *et al.*[30], Hayes and Cox (regarding respiratory rate and diastolic blood pressure)[31] and Rahmani Anaraki (in the case of arterial blood oxygen saturation%) [32].
Finally, the effects of aromatherapy massage with mint and sweet almond oils were compared with each other. The results showed that aromatherapy massage with mint oil has more considerable effect on systolic and diastolic blood pressures and respiratory rate during three days of intervention compared with aromatherapy massage with sweet almond oil. However, no significant difference was found between pulse rate and arterial oxygen saturation% in the two groups. Wolfon and Hoviet (1992) aimed to compare the effects of massage and aromatherapy massage on 36 patients hospitalized in the ICU. A significant reduction was observed in blood pressure, respiratory rate and heart rate in both groups but no difference was found between the two groups[33]. Babashahi (2012) also reported that 20-minute massage and aromatherapy massage have no effect on the patients' vital signs [34]. Don (1995) showed that that 15 to 30 minutes of massage and aromatherapy massage with lavender oil have no considerable effects on physiological parameters of 122 patients hospitalized in the ICU within 5 days. However, mood and anxiety levels were amazingly improved in the aromatherapy group. This group of patients also showed a greater adherence to the treatment program than massage group[21].

The results of the aforementioned studies comparing the two techniques of massage and aromatherapy massage are not consistent with the results of this study. These confounding results may be due to following factors: different techniques, depth and pressure of massage, the area undergoing massage, the number of interventions, particularly different types and mechanisms of disease and various diagnosis for the disease, different types of essential oils.

It is not possible to assess the effects of essential oils due to absence of adequate studies in this area. However, the key effect of mint oil as an analgesic, anxiolytic, antispasmodic, muscle relaxant and vasodilator has been confirmed in various studies. Antispasmodic effect of mint on smooth muscle is the most important pharmacodynamics of this essential oil, which interferes in calcium ion exchange through cellular membrane. Blood pressure-lowering effects can be attributed to the aforementioned property too. Increased lung capacity and improved spirometry parameters (cited in the study conducted by Memarbashi)[35]. can be attributed to antispasmodic effect of this essential oil on smooth muscle.

One goal of this study lied in comparing the effect of two methods of massage aromatherapy with mint and sweet almond oils. According to the findings and absence of adequate studies with consistent results with findings of this study, it is recommended that further studies be conducted in this field in clinical environments and the results be compared with each other in order to generalize the results to other studies.

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REFERENCES

[1] Taylor HG, Yeates KO, Wade SL, Drotar D, Stancin T, Burant C. *Journal of the International Neuropsychological Society*. **2001**;7(06):755-67.
[2] Yousefzadeh S, Dafchahi MA, Maleksari HM, Moghadam AD, Hemati H, Shabani S. *Journal of Kermanshah University of Medical Sciences* (J Kermanshah Univ Med Sci). **2007**;11(3).
[3] Lee KR, Kawai N, Kim S, Sagher O, Hoff JT. *Journal of neurosurgery*. **1997**;86(2):272-8.
[4] Yousef zade Chabok S, Safayi M, Hemati H, Mohammadi H, Shabani S. *Journal of Guilan University of Medical Sciences.* **2008**;16(64):112-9.
[5] Black JM, Hawks JH. Medical-surgical nursing: Saunders/Elsevier; **2009**.

[6] Puvanachandra P, Hyder AA. *Pak J Neurol Sci*. **2009**;4(1):27-32.
[7] Ebrahimi Fakhar Hr. *Arak University of Medical Sciences Journal*. **2010**;12(4):1-9.
[8] Maleki M, Ghaderi M, Ashktorab T, Jabbari Nooghabi H, Zadehmohammadi A. *The Horizon of Medical Sciences.* **2012**;18(1):66-74.
[9] Vahedian-Azimi A, Ebadi A, Jafarabadi MA, Saadat S, Ahmadi F. *Trauma monthly*. **2014**;19(3).
[10] Schumacher L, Chernecky CC. Critical care and emergency Nursing: Elsevier Health Sciences; 2009.
[11] R M, H S, M NM, F Z. *J Clin Res Paramed Sci*. **2013**;3(4):237-46.
[12] Lee OKA, Chung YFL, Chan MF, Chan WM. *Journal of clinical nursing*. **2005**;14(5):609-20.
[13] Yang M-H, Lin L-C, Wu S-C, Chiu J-H, Wang P-N, Lin J-G. *BMC complementary and alternative medicine.* **2015**;15(1):1.
[14] Lindquist R, Snyder M, Tracy MF. Complementary & alternative therapies in nursing: Springer Publishing Company; **2013**.
[15] National Cancer Institute (NCI) NIoH. Aromatherapy and essential oils. Retrieved from http ://www.cancer.gov/cancertopics/pdq/cam/aromatherapy/**2012**.
[16] Holt FE, Birks TP, Thorgrimsen LM, Spector AE, Wiles A, Orrell M. *Cochrane Database Syst Rev*. **2003**;3.
[17] Kanani M, Mazloum S, Emami A, Mokhber N. *journal of sabzevar university of medical science* **2012**;19(3):120.
[18] Balouchi A, Masinaeinezhad N, Abdallahimohammad A, Firouzkouhi M, Sepehri Z. *Der Pharmacia Lettre*. **2016**;8(7):148-52.
[19] Shahdadi H, Balouchi A, Taheri S, Darban F. *Der Pharmacia Lettre*. **2015**;7(10):193-7.
[20] Rezaei K, Alisaeidy A, GHORBANPOUR M, Moslemi A. *Complementary Medicine Journal of faculty of Nursing & Midwifery*. **2014**;4(3):876-90.
[21] Dunn C, Sleep J, Collett D. *Journal of advanced nursing*. **1995**;21(1):34-40.
[22] Tadrisi SD, Bahari N, Ebadi A, Madani SJ. *Journal of Critical Care Nursing*. **2012**;5(2):95-102.
[23] Akavipat P. *Neurologia medico-chirurgica*. **2009**;49(12):565-71.
[24] Halm MA. *American Journal of Critical Care*. **2008**;17(2):160-3.
[25] Eimani E, Moshtaqeshgh Z, Ali Hoseini T, Alavi Majd H, AbedSaeidi J. *The Journal of Shahid Sadoughi University of Medical Sciences.* **2009**;17(2):209-15.
[26] Hattan J, King L, Griffiths P. *Journal of advanced nursing*. **2002**;37(2):199-207.
[27] Lytle J, Mwatha C, Davis KK. *American Journal of Critical Care*. **2014**;23(1):24-9.
[28] Stevensen C. *Complementary Therapies in Medicine*. **1994**;2(1):27-35.
[29] Hajihosseini F, Avazeh A, Elahi N, Shariati A, Souri H. *Arak University of Medical Sciences Journal*. **2006**;9(3):26-35.
[30] Sutherland JA, Reakes J, Bridges C. *Journal of Nursing Scholarship*. **1999**;31(4):347.
[31] Hayes J, Cox C. *Intensive and Critical Care Nursing*. **1999**;15(2):77-82.
[32] Rahmani Anaraki H, Abdolahi A, Nasiri H, Vakili M. *Journal of Gorgan University of Medical Sciences.* **2001**;3(2):53-9.
[33] Woolfson A, Hewitt D. *International Journal of Aromatherapy*. **1992**;4(2):12-3.
[34] Babashahi M, Babashahi F, Fayazi S. *Evidence Based Care*. **2012**;2(2):19-28.
[35] Meamarbashi A. *Avicenna Journal of Phytomedicine*. **2014**;4(1):72