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The Effect of Aromatherapy on Pain, Itching, State Anxiety Levels and Respiratory Distress in Children with Burns: A Systematic Review

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Abstract

Background: Search of the literature reveals that there is no published systematic review on the effect of aromatherapy therapy on the pediatric and adolescent burns. For this reason, we conducted a systematic review to inspect the effects of massage therapy on reducing pain, itching, and anxiety levels in children with burns.

Materials and Methods: In this systematic review, English databases such as Medline, Scopus, Web of Science, EMBASE and Cochrane Library, no time limitation were conducted from inception until February 2019.

***Results*:** Three studies evaluated the effect of aromatherapy in pediatric burn patients Results: In the first study, massage therapy with Johnson's Baby Bedtime Oil decreased significantly all the pain, itching, and anxiety level of adolescents in a burn unit ($p< 0.001$). In the second study, 284 children were massaged with aromatherapy in a burns ward, no significant difference were observed in terms of comfort behavior scores ($p=0.18$), or heart rates ($p=0.18$) among the groups' oil. The third study was conducted on 71 pediatric burn patients, aromatherapy significantly decreased the pain, itching, and anxiety level ($p<0.001$). Heart rate showed a significant decrease from 118 to 109 and respiratory rate decreased significantly from 34 to 30, $p<0.001$. The child reported he fell asleep better.

Conclusion: Inhalation with essential oils can improve the pain, itching, state anxiety, respiration, the child's falling asleep, and the calmness in the pediatric burn patients. This method of treatment can be beneficial and the findings of these studies should be interpreted with caution due to the high heterogeneity between the studies, the small number of studies and small sample sizes.

Key Words: Aromatherapy, Anxiety, Burns, Children, Pain.

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1- INTRODUCTION

Burns are tissue damage caused by heat, electricity, radiation, or chemicals (1). Burn pain, the most acute type of pain, results in sleep disorders, enuresis and encopresis, difficulty in the learning and concentration, patient discomfort and dissatisfaction, delayed recovery, prolonged hospitalization, and increased issues related to the treatment acceptance. It also increases the body's metabolism, resulting in immunodeficiency, malnutrition, and sensitivity to infection. Accordingly, burn pain relief should be the first priority of all care decisions (2). Changing the burn dressing is one of the painful procedures which pediatric burn patients go through every day to relieve their pain in some way. In this regard, various pharmacological and non-pharmacological approaches to reducing pain are utilized.

Nevertheless, using narcotic analgesics in most of the cases is inevitable. Unfortunately, the narcotic analgesics are abused in that they are not used efficiently and in a recommended dose. Patients' use of the narcotic analgesics is much less than the severity of their pain. Some burn sections prescribe some pain relief as needed and patients receive less than 50% of the prescribed dose. The subsequent side effects of these drugs are the inhibiting factors of using them (3). Burn pain is the most severe kind of acute pain (4). The patient would be jeopardized physiologically and socially-psychologically if the pain is not controlled. Uncontrolled acute pain, leads to depression, low level of the life quality, prolonged post-traumatic stress response, sleep disorders, enuresis and encopresis, difficulty in the learning and concentration, patient discomfort and dissatisfaction, delayed recovery, prolonged hospitalization, and increased issues related to the treatment acceptance. It also increases the body metabolism resulting in immunodeficiency, malnutrition, and sensitivity to infection (5). In 2005, a retrospective study was conducted on children who were under 15 years old and injured in West Azarbaijan province, Iran. According to the results, 33.5% of burn-stricken children were aged under 15 years, and those who were under one year old had the highest burn severity (6.1%). The flame burns after the hot water burns were the main cause of burns, 29.8% and 63.3%, respectively.

The findings of the study indicate that women were highly threaten by burns and the severity of burns was higher in adult children (6). The burn pain and anxiety are manageable through using a variety of methods, such as the pharmacological therapies often rendered regardless of their side effects. Since every drug has side effects, in addition to its beneficial effects, it is suggested a drug with less side effects be used. Nowadays, there is a strong inclination toward the usage of plants, complementary and alternative therapies for the treatment of various diseases. Aromatherapy, derived from herbal extracts, has a particular application in the complementary medicine through utilizing the properties of volatile oils compounding specific ingredients (7, 8).

Several studies have documented the effectiveness of aromatherapy reducing pain and fatigue as well as healing the wounds. Although the precise mechanism of action is not completely clear, the fragrance appears to activate the nerve cells and stimulate the limbic tract. Smells release different neurotransmitters, including encephalin, noradrenaline, and serotonin. The smell can then affect the sensation (9). The use of complementary and alternative therapies as a low-risk, cost-effective, easy, and with limited side effects is expanding in nursing care of many health care centers. One of the complementary therapies is aromatherapy, a holistic treatment alleviating the stresses

of the nursing profession (10). The use of volatile oils or aromas extracted from aromatic plants with the therapeutic purposes is called "aromatherapy" (11) which can be used as part of an integrated multi-disciplinary event to optimize results in children struggling disparate health issues (12). A search of the literature reveals that there is no published systematic review on the effect of aromatherapy therapy on the pediatric and adolescent burns. For this reason, we conducted a systematic review to review the effects of massage therapy on reducing pain, itching, and anxiety levels in children and adolescents with burns.

2- MATERIALS AND METHODS

2- Materials and methods

Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) checklist was used as a template for this review (http://www.prisma-statement.org/).

2-1. Search strategy

In this systematic review, English databases such as Medline (via PubMed), Scopus, Web of Science, Cochrane Library, and EMBASE. Studies were published in English until February 10, 2019. Search words were a combination of: (Aromatherapy OR smell OR olfactory OR odors OR oils OR Volatile OR Phytotherapy OR complementary OR mind-body therapies) AND (Burn OR burns) AND (Pediatric OR pediatrics OR children OR Child). First, two separate researchers reviewed the title and the abstracts of articles. Those studies that seemed to be related were extracted and reviewed in their full text. In the second stage, the full text of the remaining articles was carefully reviewed and articles that met the inclusion and exclusion criteria were systematically reviewed for the quality assessment.

2-2. Study selection

Database search was done for possible studies, abstracts of the studies were screened for identification of eligible studies, full text articles were obtained and assessed and a final list of included studies was made. This process was done independently and in duplication by two reviewers, and any disagreement was resolved by the 3rd reviewer.

2-3. Data extraction

For each of the articles included in this study, a table was devised including the following variables: the first author of article, year of publication, type of study, existence of blindness, design characteristic of subjects, sample size, intervention applied (type, duration of treatment and follow up), and outcomes.

2-4. Included studies

Randomized controlled trials (RCT), clinical studies both randomized and nonrandomized either retrospective or prospective. Due to the limited number of published RCT in the literature other types of clinical and pilot studies were included. Preliminary and case report studies were not included due to limited sample size and higher risk of bias. Studies published in English until Feb 10, 2019.

2-5. Quality assessment

The quality of studies was independently assessed by two authors. They utilized five-point Jadad scale critical tool consisting of: randomization, method of randomization, blindness, method of blindness, and dropout/withdrawals and their reasons. A clinical trial could receive a Jadad score of between zero and five (13) (**Table.1**).

Table-1: The quality of included studies by Jadad scale (13).

Study, Year, (Reference)	Randomization			Blinding			Report of dropping out
	Mention randomization	Appropriate Method	Inappropriate Method	Mention blinding	Appropriate method	Inappropriate method	
O'Flaherty et al., 2012, (15)	Unclear	-	-	-	-	-	-
van Dijk et al., 2018, (14)	*	*	-	*	*	-	*
Parlak Gürol et al., 2010, (1)	Unclear	-	-	-	-	-	*

2-6. Synthesis of results

Due to the difference in the included studies, study designs, lack of control groups in some studies, sample size, type of intervention used, duration of treatment, and duration of follow- up, meta-analysis was not conducted.

3- RESULTS

Three studies evaluated the effect of aromatherapy in pediatric burn patients (**Table.2**). In the first study, massage therapy with Johnson's Baby Bedtime Oil significantly decreased all the pain, itching, and anxiety state of adolescents in a burn unit ($p < .001$) (1). In the second study, 284 children received massage with aromatherapy in a burn ward, no significant differences were observed in terms of comfort behavior scores ($p=0.18$), or heart rates ($p=0.18$) in groups' oil (14). The third study was conducted on 71 pediatric burn patients. Aromatherapy significantly decreased the pain, itching, and state anxiety ($p<0.001$). Heart rate showed a significant decrease from 118 to 109 and respiratory rate decreased significantly from 34 to 30, ($p<0.001$). The child reported he fell asleep better, too (15) (*Please see the Table.2 at the end of paper*).

4- DISCUSSION

We aimed to review the effects of massage therapy on reducing pain, itching, and anxiety levels in children and adolescents with burns. Three studies assessed the aromatherapy effect on the pediatric burn patient (1, 14, 15). In the first study, massage therapy with Johnson's Baby Bedtime Oil significantly decreased all the pain, itching, and state of anxiety of adolescents in a burn unit (1). In the second study, 284 children were given a massage with aromatherapy in a burns ward, no significant difference were observed in terms of comfort behavior scores, or heart rates in groups' oil (14). In the third study, aromatherapy decreased the pain, itching, and anxiety significantly, and heart rate showed a significant decrease from 118 to 109 and respiratory rate decreased significantly from 34 to 30, ($p < 0.001$). The child reported to fell asleep better (15).

The results of Ilter et al.'s study (2019) of the effect of inhaled aromatherapy on pain, vital symptoms, and arterial oxygen saturation during port catheterization in patients with cancer showed that inhaler aromatherapy applied to patients in the intervention group decreased pain experienced during the procedure and facilitated the procedure adherence ($p < .05$); however, it did not affect vital signs and saturation ($p > .05$) (16). A study conducted by Seyed Rasouli et al. (1998) aimed at comparing the effect of massage and inhalation aromatherapy on vital signs of burn patients. The findings of this study showed that massage aromatherapy reduces systolic blood pressure, respiratory rate and heart rate in burn patients, and

inhaled aromatherapy reduces systolic blood pressure in these patients. Therefore, using aromatherapy techniques can cause fewer changes in the vital signs of the burn patients and ultimately reduces the length of hospitalization and burn complications (17). The results of systematic review of Cooke and Ernst suggests that aromatherapy has a mild and transient anxiolytic effect, nevertheless, according to the same researchers' point of view, the results of aromatherapy on patients' anxiety and pain should be discussed. The result is not strong because of the lack of appropriate measurement, the use of the combination therapy and aromatherapy and in some studies, lower sample size (19). Lavender is an herbaceous perennial herb called Lavandula officinal that belongs to the mint family. Its English name is Lavander. It has analgesic and muscle relaxant properties (20). Lavender can be used to enhance precision, stress and antinociceptive effects for patients and even ward staff (21).

As lavender is sedative, anti-seizure, anti-anxiety, anti-epilepsy, anti-depressant, neuroprotective, analgesic, anti-inflammatory, anti-apoptosis, anti-mutation, anti-cancer properties, it can be considered as one of the effective therapeutic methods treating Neori disease (20). In Iran, a study conducted by Azizi et al. (1979) aimed to determine the effect of inhaled aromatherapy combining with lavender essential oil on the burn pain severity in patients; according to the results, using lavender aromatherapy can reduce patients' pain in a short time (21). A study by Mirzaei et al. (2008) aimed to determine the effect of lavender odorant on anxiety level in primiparous women and to investigate plasma changes of cortisol, serotonin and 5-hydroxyindole acetic acid in inhalation of this fragrance. According to the results, the level of anxiety and cortisol concentration in the intervention group were significantly reduced, whereas in the control group, the concentration of serotonin and 5-hydroxyindole indole acetic acid increased, so in this respect lavender aroma inhalation reduced anxiety during labor and decreased cortisol secretion and increased serotonin secretion (22). The results of a study by Beek Moradi et al. (2016), which examined the effect of inhalation aromatherapy with essential oil of rose flower on vital signs of burn patients after dressing replacement, showed that inhalation aromatherapy with rose flower could increase heart rate induced by inhalation. It significantly reduced burns but did not decrease systolic and diastolic blood pressure and respiratory rate in these patients (23). Orange blossom essential oil is one of the essential oils used in aromatherapy. Flowers of the bitter orange tree are called orange blossoms. Neroli essential oil is made from distilled fresh orange or bitter orange blossom. This essential oil is an amber liquid that turns red in the light.

The smell is strong, so fragrant and bitter. Neroli essential oil contains 35% different hydrocarbons, 47% terpenic alcohols such as linalool, triphenyl, geraniol, flavonoid and acetate, 6% nerolidol and 0.7 to 1.1% indole. Citrous aurantium, the scientific name of the orange blossom, is a blossom essential oil stimulating the central nervous system, enhancing the mood, and encompassing soothing, anti-spasmodic, anti-inflammatory effects (9). Flavonoids also act as agonists of benzodiazepine receptors and reduce anxiety (24). A study by Akhlaghi et al. (2011) was conducted with the purpose of comparing the effect of orange blossom and diazepam on reducing anxiety before surgery. In this study, anxiety levels were measured in two groups of orange and diazepam before and 2 hours after intervention. The level of anxiety after drug administration decreased from 24.32 ± 10.18 to 21.53 ± 11.45 and in the diazepam group decreased from 27.68 ± 8.11 to 24.68 ± 7.94. Statistical tests

showed a significant difference in the level of anxiety in the two groups after the intervention. The results of this study showed that Citrus aurantium can be used as an effective precursor to reduce anxiety in patients before surgery (24).

5- CONCLUSIONS

Inhalation with essential oils (1% blend of Lavender, German Chamomile, and Neroli), can improve the pain, itching, anxiety level, respiration, the child's ability to fall asleep, and the calmness in the pediatric burn patient. This method of treatment can be beneficial and the findings of these studies should be interpreted with caution due to the high heterogeneity between the studies, the small number of studies and small sample sizes.

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7- CONFLICT OF INTEREST

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Table-1: General characteristics of included studies into systematic review.

Study, Year, Country, (Reference)	Study design	Aromatherapy type	Outcomes	Subject	Intervention	Control	Drop out	Assessment tool	Results	Adverse effects
O'Flaherty et al., 2012, Africa, (15)	Observation prospective pilot study	1% blend of Lavender (Lavendula angustifolia), German Chamomile (Matricaria recutica), and Neroli (Citrus arantium) essential oils beforehand.	Heart rates and respiratory rates, a sign of relaxation. Behavioral responses (Sleep/awake state, facial expression, and body posture).	71	Each movement was repeated 3 times. The massage was very gentle; on a scale of 0–10 with 0 being no pressure and 10 being crushing pressure; an average pressure of 3 was used. A session typically lasted between 10 and 20 min.	-	-	Self-record	Aromatherapy massage seems to be a helpful non-pharmacological approach to reduce hospitalized pediatric burn patients' distress.	-
van Dijk et al., 2018, Africa, (14)	RCT	The aromatherapy consisted of a 1% blend of Chamomile (Matricaria recutica), Lavender (Lavendula angustifolia), and Neroli (Citrus arantium) essential oils in grapeseed oil.	Scores on the Muscle Tension Inventory (MTI), and Behavioral Relaxation Scale (BRS) to assess level of relaxation. Scores on the COMFORT behavior scale and Numeric Rating Scale Distress to assess level of distress.	176/108	Massage was provided by four aroma therapists trained in the 'M' technique.in which each stroke and sequence is performed in a set pattern, at a set pressure and set speed, and repeated three times.	Massage	-	The Behavioral Relaxation Scale (BRS)	This trial found no positive effect of either aromatherapy massage or massage with carrier oil only in pediatric burn patients.	-
Parlak Gürol et al., 2010, Turky, (1)	Experimental study	Johnson and Johnson butter (Baby oil Natural Calm, pH 5.5; Johnson and Johnson, New Brunswick, NJ).	Pain, itching, and anxiety levels.	32/31	These patients received 15-minute massage therapy sessions twice a week during 5 weeks. The massage therapies were held just before the medical treatments and dressing in the mornings. The massages were conducted by trained massage therapist. The therapies were done by the same therapist.	Standard medical care	-	Visual Analog Scale (VAS), State Trait Anxiety Inventory (STAI)	In most cultures, massage treatments are used to alleviate a wide range of symptoms.	-

RCT: Randomized clinical trial.