



Evaluation of the effect of aromatherapy with lavender essential oil on post-tonsillectomy pain in pediatric patients: A randomized controlled trial



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ABSTRACT

Objective: To evaluate the effect of aromatherapy with *Lavandula angustifolia* essential oil on post-tonsillectomy pain in pediatric patients.

Methods: This was a randomized controlled prospective clinical trial. In this study, 48 post-tonsillectomy patients aged 6–12 years were randomly assigned to two groups (24 patients in each group). After tonsillectomy surgery, all patients received acetaminophen (10–15 mg/kg/dose, PO) every 6 h as necessary to relieve pain. The patients of the case group also inhaled lavender essential oil. The frequencies of daily use of acetaminophen and nocturnal awakening due to pain, and pain intensity (evaluated using visual analog scale [VAS]) were recorded for each patient for 3 days after surgery. Finally, the mean values of variables were compared between two groups separately for each post-operative day.

Results: The use of lavender essential oil caused statistically significant reduction in daily use of acetaminophen in all three post-operative days but had not significant effects on pain intensity and frequency of nocturnal awakening.

Conclusion: Aromatherapy with lavender essential oil decreases the number of required analgesics following tonsillectomy in pediatric patients.

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1. Introduction

Tonsillectomy is one of the most frequent surgeries performed in children. The main complications of this procedure are pain, hemorrhage, nausea and vomiting [1]. Severe pain may cause poor oral intake and dehydration, leading to morbidity and delayed recovery [2]. Nonsteroidal anti-inflammatory drugs (NSAIDs) have been widely used in this setting for pain relief. However, classic NSAIDs further increase the risk of bleeding after tonsillectomy due to reversible inhibition of platelet aggregation [3,4]. Therefore, acetaminophen is commonly used as a safe analgesic for this purpose [5]. However, no ideal treatment regarding efficacy and adverse effects has yet been developed for post-tonsillectomy pain. On the other hand, considering that patients with post-operative

nausea and vomiting may not be able to use oral drugs, search for analgesic agents with non-oral routes of administration is necessary.

A great number of aromatic and medicinal plants contain chemical compounds exhibiting different biological properties and activities [6], making them appropriate for aromatherapy. Aromatherapy, which has a wide range of applications and is easy to perform, has recently received much attention [7]. Aromatherapy is noninvasive and can be applied continuously to patients who do not have an aversion to the odors [8]. *Lavandula angustifolia* Mill. (Lavender), commonly named “Ostokhoddous” in Iran, is well known as a powerful aromatic and medicinal herb. The plant is used in traditional medicine in different parts of the world for its analgesic and anti-inflammatory activities [9]. It is used for the treatment of several gastrointestinal, nervous and rheumatic disorders [10–12]. The infusions of the plant have also been used in Iranian folk and traditional medicine as carminative, diuretic, anti-epileptic, anti-rheumatic and pain reliever especially in nervous

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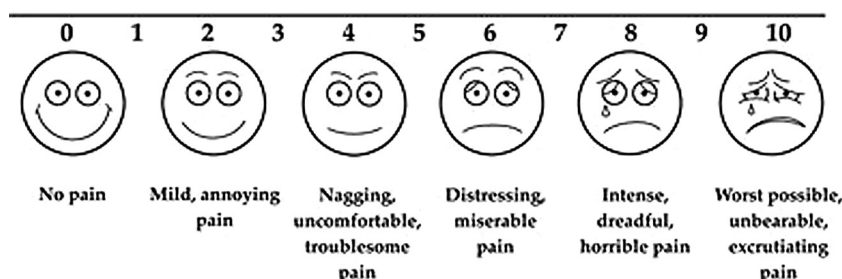


Fig. 1. Visual analog scale (VAS) for assessment of pain intensity in pediatric patients.

headache and migraine [13]. In this randomized controlled prospective research, we evaluated the effectiveness of aromatherapy with lavender essential oil on post-tonsillectomy pain in children.

2. Materials and methods

This was a randomized controlled clinical trial performed in a university affiliated hospital in Isfahan, Iran. The study protocol was approved by the institution's ethical committee. The pediatric patients aged 6–12 years who underwent tonsillectomy surgery were randomly and equally assigned to case and control groups. Before any intervention, the study purpose and process were explained for parents and the informed consent was obtained from them. After tonsillectomy surgery, all patients received acetaminophen (10–15 mg/kg/dose, PO) every 6 h as necessary to relieve pain. The patients of the case group also inhaled lavender essential oil every 6 h. For this, they were instructed to distil 4 droplets of the essential oil on their palm, rub their hands together and inhale it for 3 min. No patient allergic to lavender essential oil was included

in the study. The frequencies of daily use of acetaminophen and nocturnal awakening due to pain, and pain intensity were recorded for each patient for the first 3 days after surgery. Pain intensity was assessed using visual analog scale (VAS, Fig. 1), a form displaying different facial appearances scored from 1 to 10. Finally, the mean values of variables were compared between two groups separately for each post-operative day.

SPSS 16 was used for statistical analysis. One-way ANOVA followed by Duncan test was applied. $P < 0.05$ was considered as the level of significance.

3. Results

A total of 48 pediatric patients were included in the study and completed its protocol (24 patients in each group). The case group (acetaminophen + lavender) included 14 males and 10 females and control group (acetaminophen) included 13 males and 11 females ($P = 0.77$). The mean age of case and control groups were 7.66 ± 2.10 and 7 ± 2.14 , respectively ($P = 0.32$). The use of lavender essential oil in post-tonsillectomy patients caused statistically significant reduction in the frequency of daily use of acetaminophen in all the first three days after surgery (Fig. 2) but had not statistically significant effects on pain intensity (Fig. 3) and frequency of nocturnal awakening (Fig. 4).

4. Discussion

In this study, we assessed the effect of aromatherapy with lavender essential oil, as an available, practical and non-invasive treatment option, on post-tonsillectomy pain. Our results showed significant effect of lavender in reduction of analgesic use. In the study of Kim and colleagues, lavender essential oil significantly decreased the use of morphine in post-anesthesia care unit after laparoscopic adjustable gastric banding [14]. In contrast, in another study, lavender essential oil had not significant effect on the reduction of analgesic use after breast biopsy [15]. In our work, lavender had not significant effect in reduction of pain intensity based on VAS and frequency of pain-related nocturnal

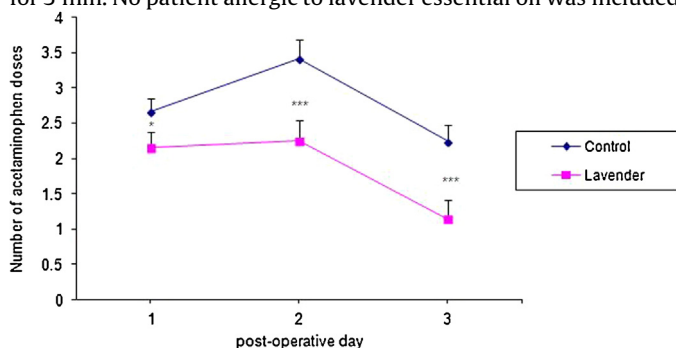


Fig. 2. Comparison of the frequency of daily use of acetaminophen (10–15 mg/kg/dose, PO) between case ($n = 24$) and control ($n = 24$) groups in three post-operative days. * $P < 0.05$, *** $P < 0.001$.

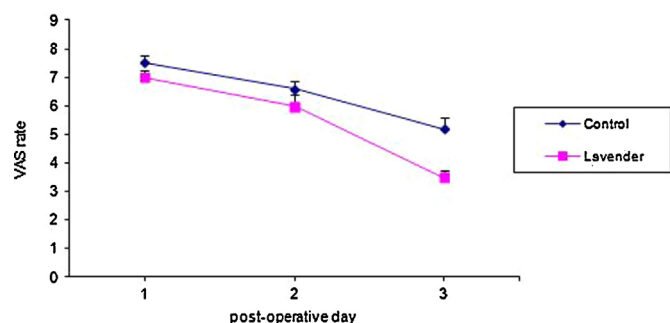


Fig. 3. Comparison of pain intensity based on visual analog scale (VAS) between case ($n = 24$) and control ($n = 24$) groups.

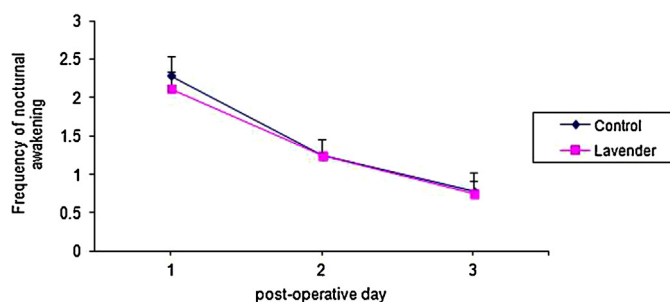


Fig. 4. Comparison of the frequency of nocturnal awakening due to pain between case ($n = 24$) and control ($n = 24$) groups.

awakening. In the study of Yip and Tse on patients with nonspecific low back pain, after one week of treatment, lavender essential oil significantly reduced pain intensity, assessed by VAS, compared to control group [16]. Similar to our results, in both above-mentioned studies, no significant effects on pain intensity were observed despite the substantial effects on the frequencies of analgesic use [14,15]. The lack of effect on pain severity in these works, as with our study, might be due to the use of analgesic agents in case and control groups that would make the assessment of pain intensity more difficult. Also, the subjective nature of pain intensity assessment by VAS and unavoidable differences in patients judgments could be another contributing factor.

Pain following tonsillectomy is suggested to be due to post-operative inflammation, nerve irritation, and pharyngeal spasm [17]. The analgesic effects of lavender essential oil could be related to its anti-inflammatory properties. Inhibition of mast cell degranulation and histamine release has been shown in both *in vitro* and *in vivo* situations [18]. Also, 1,8-cineole, one of active compounds in lavender essential oil, inhibits the production of prostaglandins (e.g., PGE2) and leukotrienes (e.g., LTB4) through blockade of arachidonic acid metabolism [19].

The most important limitations of our study include small sample size and the lack of placebo in control group because of distinct odor of the essential oil making the use of a suitable placebo very difficult. Therefore, randomized double-blinded controlled studies with larger sample size should be conducted to confirm our results and, more accurately, detect beneficial effects of lavender essential oil on post-tonsillectomy pain.

In conclusion, this study suggests that aromatherapy with lavender essential oil decreases analgesic requirement following tonsillectomy in pediatric patients. This could be a cost-effective, available and safe treatment option.

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