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Original Article

The Effect of Inhaled *Rosa Damascena* (Damask Rose) Aromatherapy on the Severity of Anxiety in Adults following Lower Extremity Orthopedic Surgery

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ABSTRACTA

Postoperative anxiety may increase postoperative pain perception and the need for opioids and potential complications of surgery. The aim of this study was to investigate the effect of inhaled rose aromatherapy on the severity of anxiety after surgery. This clinical study was conducted on 100 patients undergoing lower extremity orthopedic surgery and was randomized into two intervention and placebo groups (50 patients in each group). After the end of the operation, all patients were examined in the recovery room for postoperative nausea and vomiting (PONV), agitation, and pain. We identified agitation in 32 patients. After surgery, pain intensity, anxiety, nausea, and vomiting were less than in the placebo group (*p-value* <0.05). Patient satisfaction was higher in the aromatherapy group (*p-value* =0.011). Damask Rose aromatherapy reduces the severity of anxiety and pain and increases patient satisfaction after lower extremity orthopedic surgery. It is recommended as an inexpensive and low-risk complementary treatment.

Keyword: Adult, Anxiety; Aromatherapy

INTRODUCTION

Early post-anesthesia recovery is a period in which organ systems recover from the effects of anesthesia and surgery [1]. Higher levels of sedation in the recovery room have been associated with increased postoperative respiratory complications [2]; in contrast, postoperative agitation can result in caregiver or patient injury [3]. Both can lead to poor patient care and complications in the recovery room. Short-acting volatile anesthetics such as sevoflurane and desflurane are associated with a higher incidence of delirium than longer-acting agents (eg, halothane and isoflurane), and intravenous anesthetics such as propofol pose a lower risk [4, 5]. Increased postoperative pain has been determined as the triggering factor for agitation and delirium [6]. Prolonged operations have been correlated with an increased incidence of delirium [6]. Patient characteristics such as advanced age [7], preexisting anxiety, psychiatric disorders, PTSD, use of psychotropic medications, and substance abuse may also predispose patients to agitation and delirium [8, 9]. Anxiolytic drugs used for prevention or treatment can cause problems like amnesia, persistent drowsiness, and respiratory depression [10]. Complementary medicine methods often have few side effects and few risks and can be used alone or in combination with other methods. One of these methods is aromatherapy. Aromatherapy can be effective in reducing the severity of anxiety, pain, fatigue, and healing skin wounds. But these effects have not been accurately demonstrated and the exact mechanism by which aromatherapy works is not fully understood [11]. *Rosa damascena* (Damask Rose) essential oil aromatherapy has antidepressant effects and is reported to be effective in treating postpartum depression, relieving menstrual pain, and relieving morphine withdrawal symptoms. To date, no specific side effects have been observed from the use of Damask Rose essential oil [12].

Due to the importance of reducing patients' postoperative anxiety and the simplicity of aromatherapy, the present study was conducted to investigate the effect of aromatherapy with Damask rose essential oil on anxiety levels after bimalleolar ankle fracture surgery under general anesthesia.

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METHODS

After approval by the local ethics committee (IR.SBMU.RETECH.REC.1401.472; IRCT: IRCT20120910010800N7) and obtaining written informed consent, this randomized controlled trial was conducted on 100 patients 18 years and older with ASA physical status I or II who were enrolled in the study to receive general anesthesia for elective bimalleolar ankle fracture surgery at a university hospital. Patients who use other methods to reduce the severity of anxiety, such as relaxation and music therapy, lack of understanding and speaking in the official language, history of allergy to roses, olfactory dysfunction, active mental or neurological disorders, use of psychiatric drugs, smoking, and substance abuse were excluded from the study. Patients with other catheters (e.g. central venous catheter, urinary catheter, etc.) were also excluded from the study.

Based on our preliminary investigation, the number of samples was determined to be 80 people based on the pilot study. Taking into account the probability of dropout of 20%, the number of 100 patients was determined to participate in this study. The sample size and the allocation sequence were generated by computer software (PASS 2021 Power Analysis and Sample Size Software. NCSS, LLC. Kaysville, UT, USA) with 1:1 parallel groups and blocks-of-four randomization with a set block size. By using sealed, numbered envelopes that were specifically made for this experiment, we were able to mask the patient trial ID and achieve the desired level of allocation concealment. Patients were randomized into two intervention and placebo groups (50 patients in each group). At the time of admission in the operating room and thirty minutes before surgery, two drops of 33% Damask Rose Oil (Barij Essence, Pharmaceutical Company, Kashan, Iran) were poured onto a napkin and the patient was asked to smell it at a distance of ten centimeters for ten minutes in the aromatherapy group. Blinding of the study by the investigator and the patient was not possible due to the rose smell. The above method was used in the placebo group but with two drops of water instead of essential oil. All patients had only one intravenous catheter for fluid therapy and drug administration. After standard monitoring (electrocardiogram, noninvasive blood pressure, pulse oximetry, and end-tidal CO2), anesthesia was started with midazolam 0.05 mg/kg and fentanyl 2 micrograms/kg as premedication, followed by propofol 2 mg/kg and atracurium 0.1 mg/kg. An appropriately sized laryngeal mask was used for airway management. Mechanical ventilation began to maintain ETCO2 at approximately 35-45 mmHg. Anesthesia is maintained with 1% isoflurane and fentanyl 1-2 micrograms/kg every 45 minutes. After the end of the operation, all patients were assessed in the recovery room for postoperative nausea and vomiting (PONV), agitation, and pain. Pain intensity was measured using a 10-point visual analog scale (VAS) from no pain (=0) to maximum possible pain (=10) and patients were asked to indicate their pain intensity on the ruler. The VAS was recorded in one of three categories mild (VAS<4), moderate (VAS= 4-6), or severe (VAS>7) pain. Patients with a VAS greater than 4 were considered to receive fentanyl 20 micrograms intravenously. Agitation was assessed using the Riker Sedation-Agitation Scale (Table 1). Twenty-four hours after the end of the surgery, all patients rated their satisfaction from 0 (completely dissatisfied) to 10 (completely satisfied). Data analysis was performed using SPSS software version 17, and due to the abnormal distribution of the data, nonparametric tests (e.g., Mann Whitney U test, Spearman's correlation) were used.

RESULTS

Of the 110 participants, three were excluded from the study because of headaches after smelling rose oil, three because of personal withdrawal, and four because of incomplete information collection. The remaining 100 subjects were studied in aromatherapy and placebo groups. As indicated in Table 2, there were no significant differences between groups in terms of age, gender, ASA physical classification, body mass index (BMI), or duration of surgery (*P-value* >0.05).

To assess the level of anxiety in the recovery room, we used the Riker Sedation-Agitation Scale. Cases in the aromatherapy group generally had lower scales than the placebo group. Agitation was a common problem in more than 50% of cases in the placebo group and only 18 cases were calm or sedated. On the other hand, more than 50% of the patients in the aromatherapy group were calm or sedated. Analysis using the chi-square test showed significant differences between the two groups (*P-value* =0.003) and these data were supported by Spearman's correlation (*P-value* =0.000), but we cannot find any association between anxiety and age, gender, ASA class, BMI, and duration of surgery.

Pain intensity was measured using the Visual Analog Scale method and patients were asked to indicate their pain intensity on the ruler. The VAS was recorded in one of three categories of mild, moderate, or severe pain. Patients in the aromatherapy group complained less about pain than in the placebo group and using the chi-square test, this difference was found to be significant (*P-value* =0.025). This information was confirmed using the Mann-Whitney U test. Using Spearman's correlation, the relationship between pain intensity and the patient's anxiety in the recovery room was investigated and it was shown that this relationship, although not strong (correlation coefficient =0.539), was significant (*P-value* =0.000).

PONV occurred in 28 (28%) of all cases. There was almost no difference between the two groups in terms of severe nausea or vomiting, but mild nausea was significantly less in the aromatherapy group (*P-value* =0.025). Again, using Spearman's correlation, the relationship between the patient's pain intensity and anxiety in recovery was assessed and the relationship between the two, although not strong (correlation coefficient = 0.214), was shown to be significant (*P-value* =0.033).

Patient satisfaction after 24 hours after the end of surgery was much higher in the aromatherapy group (*P-value* =0.011). We also found a negative correlation between satisfaction and high levels of agitation and pain score (*P-value* =0.000).

DISCUSSION

Aromatherapy can stimulate pathways in the limbic and hypothalamic systems and reduce the release of corticotropin. Decreased release of this hormone by the pituitary gland reduces the production of cortisol in the adrenal glands, which decreases the severity of anxiety [13]. This effect is attributed to the stimulation of neurotransmitters, which leads to a reduction in pain and an increase in relaxation [12,14]. Rose oil aromatherapy has been shown to reduce anxiety during labor [13]. In addition, aromatherapy with *Rosa damascena* essential oils had been shown to reduce nurses' occupational anxiety[15,16]. Anxiolytic effects of *Rosa damascena* have been demonstrated in various studies [17–21] but Fazlollahpour-Rokni et al. could not show any reducing effects of preoperative anxiety during heart surgery [22]. Haehner et al. found no anxiolytic properties of rose essence in healthy subjects [23]. Few studies have shown the anxiolytic effects of *Rosa damascena* in the postoperative period [24, 25]. In the present study, the Riker Sedation-Agitation Scale was used to assess anxiety levels and there was a significant reduction in agitation in the aromatherapy group. Although some studies have identified age [26], female gender [27], BMI [28], and prolonged surgery [28,29] as prognostic factors for anxiety, the present study failed to show these associations.

The present study showed a significant reduction in pain in the aromatherapy group. However, this reduction was only for mild pain. Some authors showed the same beneficial effects [24,25,30], but this finding was not supported in the Smith study [31].

PONV was unaffected by the use of rose oil [32,33], but a lower incidence of PONV was found in the aromatherapy group in the present study. This may be due to the greater comfort of patients in this group, as satisfaction 24 hours after surgery was significantly better in the aromatherapy group.

There were several differences between our research and other studies. The species of Damask Rose and the duration and timing of aromatherapy, as well as the study design and population, could account for the discrepancies mentioned. Due to the fragrance of the materials used in aromatherapy, these types of studies have problems in blinding and designing the execution method. Our study also had this type of limitation.

CONCLUSION

This study showed that inhalation aromatherapy with Damask Rose Oil can be effective in reducing the severity of anxiety, pain, and PONV and increasing patient satisfaction after surgery. Therefore, using inhalation aromatherapy with Damask Rose to reduce patients' anxiety after surgery can be recommended as a simple, inexpensive, safe, and non-invasive method. Since it does not interfere with the main treatment, it can increase patient acceptance and satisfaction.

Previous experience with the scent of roses and personal feelings can limit the study. In addition, the scent of rose oil prevented participants and researchers from being blinded during the study. Another challenge was the inability to provide long-term follow-up. To address the above issues, it is helpful to conduct a large study with a better design.

Conflict of Interest

The authors declare that they have no known financial or interpersonal conflicts that would have seemed to have an impact on the research presented in this study.

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