
ORIGINAL ARTICLE

Evaluation of Aromatherapy in Treating Postoperative Pain: Pilot Study

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■ **Abstract:** This study compared the analgesic efficacy of postoperative lavender oil aromatherapy in 50 patients undergoing breast biopsy surgery. Twenty-five patients received supplemental oxygen through a face mask with two drops of 2% lavender oil postoperatively. The remainder of the patients received supplemental oxygen through a face mask with no lavender oil. Outcome variables included pain scores (a numeric rating scale from 0 to 10) at 5, 30, and 60 minutes postoperatively, narcotic requirements in the postanesthesia care unit (PACU), patient satisfaction with pain control, as well as time to discharge from the PACU. There were no significant differences in narcotic requirements and recovery room discharge times between the two groups. Postoperative lavender oil aromatherapy did not significantly affect pain scores. However, patients in the lavender group reported a higher satisfaction rate with pain control than patients in the control group ($P = 0.0001$). ■

Key Words: lavender oil, patient satisfaction, postoperative pain

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INTRODUCTION

Lavender oil has been attributed with mood-enhancing and analgesic properties by aromatherapists. Lavender oil aromatherapy did not change the use of postoperative analgesics in patients who have had breast biopsies. However, patients who received lavender aromatherapy reported significantly higher satisfaction with pain control.

Common analgesic goals during the postoperative period include minimizing pain and nausea, as well as decreasing the time to discharge and improving the patient's overall satisfaction. However, many of the current pain medications (specifically opioids and nonsteroidal anti-inflammatory drugs) are associated with side effects, which include respiratory depression, nausea, pruritis, and bleeding.^{1,2} The use of complementary non-pharmacological treatments as an adjunctive therapy in the perioperative period may decrease the requirements for traditional analgesics, hence reducing the incidence of adverse effects. Aromatherapy is one of the potential methods of reducing perioperative pain and improving the patient's satisfaction.

Physiological and psychological effects of aromatherapy have been recognized in folk medicine for a long time.³ Lavender oil has been particularly attributed with mood-enhancing and analgesic properties in healthy subjects and in experimental nociception.^{4,5} This ther-

apy has been successfully utilized to alleviate pain in clinical settings as diverse as changing dressings in the intensive care unit,⁶ palliative care,⁷ for control of labor pain,⁸ as well as chronic pain.⁹ There are numerous anecdotal reports and small studies that have described the use of this therapy to relief anxiety and improve mood.¹⁰ Limited research has shown that women in labor perceive aromatherapy as helpful, and as decreasing the woman's need for pain medications.¹¹ The role of aromatherapy in the perioperative setting, however, is poorly understood.

Given the potential positive impact of lavender oil on the patient's physiological and psychological state, the goal of our pilot study was to determine whether these positive properties of lavender aromatherapy might improve the postoperative course of patients who have had breast biopsies. We investigated whether there was any effect of lavender oil on pain, narcotic use, nausea, length of stay in the recovery room, and satisfaction with pain control.

MATERIALS AND METHODS

Subjects

This study was approved by the Institutional Review Board (IRB) of New York University School of Medicine. Fifty patients ages between 18 and 65 years with an American Society of Anesthesiologists (ASA) physical status of I–III scheduled for breast biopsies were recruited to participate in the study. This particular type of surgery was chosen in order to limit the variability in postoperative pain from one patient to another. Patients with a history of asthma, bronchitis, chronic obstructive pulmonary disease, contact dermatitis to cosmetic fragrances, or pregnant at the time of the study were excluded.

Study Design

All patients who consented to the study received a lavender oil patch test, preoperatively. This was suggested by the IRB of New York University to rule out sensitivity to lavender. One drop of lavender oil was applied to the inside of the patient's wrist. In order to reduce inhalation and skin absorption of the lavender, the test patch was immediately covered with an occlusive dressing and removed after a two-minute exposure. The patients were randomized into two groups, according to a predetermined random sequence. Patients in the lavender group received oxygen with a face mask coated with lavender oil upon arrival to the postanesthesia care unit (PACU). Two drops of 2% lavender oil were

applied with a cotton swab to the inside of an oxygen face mask. Patients in the control group received oxygen through a face mask with no lavender oil upon arrival to the PACU. All patients who complained of pain received oxycodone/acetaminophen (5 mg/325 mg), one or two tablets by mouth.

Anesthetic Management

Every patient was monitored according to ASA standard practice guidelines. Patients received fentanyl (1.5 µg/kg), midazolam (0.05 mg/kg), and small boluses of propofol as needed for sedation intraoperatively. Patients will also receive supplemental oxygen throughout the surgery. The surgeon administered 10-mL lidocaine (1%) into the surgical site prior to the incision.

Data Collection

Pain intensity was evaluated with a numeric rating scale (NRS: 0 = no pain to 10 = severe pain). If the NRS score was ≥ 2 , oxycodone/acetaminophen (5 mg/325 mg) was given. Patients were assessed for pain at 5, 30, and 60 minutes after arrival in the PACU. The following variables were recorded: NRS scores in the PACU at 5, 30, and 60 minutes, total amount of analgesics and antiemetics, incidence of nausea/vomiting, satisfaction with pain control (0–10), as well as discharge time from the PACU. Any adverse effects of lavender aromatherapy were documented. Discharge criteria include postoperative level of consciousness, stable vital signs, respiratory stability as well as a pain score < 2 .

Statistical Methods

Differences in demographic data and perioperative drug use between groups were analyzed by unpaired Student's *t*-tests. Proportion of patients reporting pain, postoperative analgesic requirements, and the patient's satisfaction scores were analyzed by using chi-squares or Fisher's exact tests as appropriate. Statistical significance was accepted for $P < 0.05$. Analyses were performed with the software SigmaStat 1.0 (Jandel Scientific, San Rafael, CA, USA).

RESULTS

The two groups were comparable with respect to demographic data, duration of surgery, and intraoperative doses of propofol and fentanyl (Table 1). Arterial blood pressure, heart rate, and peripheral oxygen saturation remained stable during the study.

The NRS score did not differ significantly between groups at 5, 30, and 60 minutes. Six patients in the

Table 1. Patient Demographic and Perioperative Characteristics

	Control	Lavender
Age (years)	47.8 ± 15.2	42.8 ± 12.5
ASA physical status	1.6 ± 0.6	1.4 ± 0.4
Weight (kg)	64.4 ± 13.0	62.1 ± 10.4
Anesthesia time (minutes)	48.6 ± 14.0	43.6 ± 11.0
Fentanyl (mcg)	99.0 ± 53.7	95.0 ± 34.6
Midazolam (mg)	2.4 ± 1.3	2.7 ± 1.5
Propofol (mg)	216.1 ± 106.7	217.6 ± 56.9

Data are mean ± SD.
ASA, American Society of Anesthesiologists.

Table 2. NRS Scores and Analgesic Requirements in the PACU

	Control <i>n</i> = 25	Lavender <i>n</i> = 25
5 minutes (<i>n</i> ,%)	6, 24%	2, 8%
NRS of patients in pain	1.26	0.2
30 minutes (<i>n</i> ,%)	7, 28%	4, 16%
NRS of patients in pain	1.1	0.6
60 minutes (<i>n</i> ,%)	9, 36%	5, 20%
NRS of patients in pain	1.42	0.6
Number of patients requiring analgesia	6, 24%	1, 4%
Mean number of tablets per user	1.2	1

NRS, numeric rating scale; PACU, postanesthesia care unit.

Table 3. Satisfaction with Pain Control

	Control	Lavender
Excellent (%)	52	92*
Good or fair (%)	48	8*

**P* < 0.05.

control group and one patient in the lavender group required rescue medications. There was also no significant difference in discharge time from the PACU (Table 2). Significantly more patients in the lavender group rated their overall satisfaction with postoperative pain control higher than patients in the control group (Table 3). Two patients (one in each group) experienced nausea and were treated with ondansetron. The only other adverse reaction noted was one instance of a headache in a patient with a history of migraine (lavender group). There was no lavender oil-related adverse hemodynamic, respiratory, gastrointestinal, or allergic reaction observed during the study.

DISCUSSION

Our pilot study shows that, within the limits of our trial, postoperative lavender aromatherapy improves patients' satisfaction with pain control after breast biop-

sies; however, there was no objective correlate of this subjective experience. Neither the intensity of pain as measured by the NRS scores, nor the proportion of patients who required supplemental postoperative analgesia shows any statistical differences. The results of this study support previous work that indicated that aromatherapy does not produce a detectable analgesic effect, but reduces the subjective experience of pain unpleasantness.¹²

Essential oils exert both physiological and psychological effects.¹³ When lavender is inhaled for 10 minutes, there is an increase in blood flow and a decrease in galvanic skin conduction and systolic blood pressure (indicating a reduction in sympathetic nerve activity¹⁴). Lavender treatment produced significant antinociception in the animal model.⁵ Human studies with lavender have demonstrated a significant relaxation effect and reduced anxiety, but no direct antinociception.^{15,16} It is difficult to translate the results of the animal studies to humans because a dose-response curve for essential oils was never established. The use of lavender oil in a perioperative setting (in this experimental condition) may produce beneficial effects, not through its direct analgesic effects, but by providing a pleasant experience and reduced anxiety level.

Lack of opioid-sparing effect may also be explained by the low intensity of postoperative pain associated with breast biopsies. The narcotic requirements among the patients were not uniform in distribution. Most patients did not require any narcotics. Hence, there are limitations in investigating the potential analgesic benefits of lavender aromatherapy using this model. A study involving a procedure associated with more intense postoperative pain may increase the discriminating power of the therapy.

Patient satisfaction as an outcome measure is a recent focus in health care.^{17,18} A patient satisfaction survey measures how well patients' expectations were met and their overall perception of pain management. Although the determination of satisfaction with postoperative pain generally requires a multidimensional inquiry, a simple, self-reporting scale of global satisfaction is commonly used to grossly compare different pain management strategies. Although there were no statistically significant differences in the NRS score or opioid requirements, significantly more patients in the lavender group rated their satisfaction higher than in the control group. Retrospective pain evaluation is directly related to the overall satisfaction with the perioperative experience.

There was no significant difference in time to discharge from the PACU between the lavender and control group. PACU length of stay is linked to postoperative pain and to nausea (side effects of narcotics), as well as to multiple administrative factors. Patients after breast biopsies have a low incidence of pain and/or side effects. Hence, it is not surprising that patients in both groups had similar PACU discharge times. The question of whether lavender aromatherapy may improve discharge time from the recovery room would be more apparent in a larger study involving a more intense postoperative pain stimulus.

Several additional limitations of this study deserve mention. The sample size for this pilot trial was not calculated a priori, but was chosen arbitrarily. This is the first study designed specifically to evaluate the use of aromatherapy in the perioperative setting. Hence a power analysis could not be performed with any degree of confidence. A lack of statistical power limits the validity of our conclusions. Type II error cannot be ruled out.

The dose of lavender oil in our study was chosen without consultation with the qualified aromatherapist. Although the dose and administration technique is well-documented in the literature, it is possible that our aromatherapy treatment was not sufficient to alter pain responses. Moreover, it is common to administer aromatherapy in a dim-lighted room with soothing music. The busy PACU of the major teaching hospital is not an ideal setting for the treatment.

We did not evaluate the patient's anxiety or mood level preoperatively. As patients were assigned randomly to the experimental conditions, we assume that their anxiety (mood) level was similar across the groups. Given the small sample size in this pilot study, this assumption might not be appropriate. However, patients' stratification (based on their anxiety level) would have been helpful in correlating their pain perception and psychological status.

Because of the distinct perfume of lavender oil, it was difficult to use a placebo in this study. The lavender aromatherapy was initially administered immediately after surgery while the patients were sedated. As the patients recovered from the effect of sedation, they may have recognized the lavender oil perfume. As the study was not blinded, the possibility of a placebo effect cannot be ignored.

Another possible limitation of the study is related to the fact that all volunteers were tested for sensitivity to lavender. Incidental inhalational exposure was limited

by immediately placing an occlusive dressing patch on the exposed skin. In order to reduce possible skin absorption of the lavender from the test patch, the lavender was removed after two minutes. Although it is unlikely that exposure to lavender oil preoperatively affects postoperative pain perception, the possibility can not be ruled out. Patients in both groups were exposed to preoperative lavender oil, thus reducing the possibility of preferential effect of this treatment.

In summary, we conducted a prospective, open-label, pilot study, investigating the effects of lavender aromatherapy on postoperative pain control in breast biopsy patients. There was no difference in the use of postoperative analgesics. However, the patients in the lavender group reported significantly higher satisfaction with pain control. Given the minimal side effects of this intervention, lavender treatment may warrant further consideration.

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