Original Article

Aromatherapy Effectivity in Controlling Anxiety, Respiration Rate, Pulse Rate, and Pain in Bronchoscopy

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Abstract

Background: Bronchoscopy is a relatively safe diagnostic and therapeutic procedure, but it is often reported as an uncomfortable experience and causes acute procedural anxiety that affects the procedure and the patient and operator's comfort. Anti-anxiety drugs have the risk of causing mild to severe side effects. Therefore, we need premedication with potent anxiolytics with minimal side effects, such as the use of aromatherapy. This study aims to analyze the effectiveness of aromatherapy as an additional premedication to reduce anxiety, respiratory rate, pulse rate, and pain in patients undergoing bronchoscopy.

Method: A clinical study with experimental quasi pre-post test control group design using consecutive sampling was performed in pulmonary patients undergoing bronchoscopy in dr. Moewardi Hospital from February to March 2020. The study subjects were randomized into three groups: lavender aromatherapy, orange aromatherapy, and control. Hospital anxiety and depression scale (HADS) score, respiratory rate, pulse, and visual analogue scale (VAS) pain score were measured before and after bronchoscopy.

Results: A total of 45 subjects of lung patients undergoing bronchoscopy participated in this study. Post hoc test differences in the HADS anxiety score of lavender and orange groups showed a significant decrease (P=0.011); (P=0.083), respectively. The decrease in the control group was not significant (P=0.622). There was a significant decrease in the respiratory rate of lavender (P≤0.0001), and orange groups (P=0.001), while the control group did not decrease (P=0.515). There was a significant decrease in pulse rate in the lavender (P=0.004) and orange (P=0.011) groups. The decrease in the control group was not significant (P=0.900). There was a significant decrease in VAS pain scores in the lavender and orange groups with each (P<0.001), whereas, in the control group, there was an increase in VAS pain scores.

Conclusion: Aromatherapy effectively controls anxiety, respiration rate, pulse, and pain in bronchoscopy patients.

Keywords: aromatherapy, bronchoscopy, HADS, respiration rate, VAS pain score

INTRODUCTION

Bronchoscopy is an endoscopic technique examination procedure for visualization of the larynx, trachea, and lower respiratory tract with diagnostic and therapeutic purposes. Bronchoscopy procedures are often reported as an uncomfortable experience and often make patients refuse to do a re-examination procedure. This becomes an obstacle in establishing the patient's diagnosis. Benchmarking the success of bronchoscopy is focused on patient satisfaction alongside the diagnostic and therapeutic value of the bronchoscopy procedure. One of the main factors affecting patient satisfaction is anxiety about the bronchoscopy procedure.[1–5]

According to Poi et al, the incidence of anxiety during bronchoscopy is 68 percent. Anxiety can increase cortisol levels, blood pressure, pulse, and respiration, affecting patient tolerance to bronchoscopy. For practitioners, anxiety in patients can hinder the success of bronchoscopy procedures. Anxiety about certain medical procedures is called acute procedure anxiety. Acute procedural anxiety is an excessive fear of medical procedures that triggers acute *distress* or interferes with completing the procedure to be performed.[1–5]

Anxiety can be reduced by preparing the patient and premedication before the bronchoscopy procedure. Premedication of sedative and analgesic drugs can increase patient satisfaction and reduce patient discomfort during the procedure. Bronchoscopy can be done under general anaesthesia or only light sedation, but the premedication given can cause side effects. Anxiety can increase the need for sedation, resulting in an increased risk of anaesthesia, including prolonged sedation, amnesia, and respiratory depression. The ideal anxiolytic is potent with minimal side effects.[1,4,6,7]

Clinical trials related to other modalities in reducing anxiety include adding hypnotherapy or music to the series of patient preparations for bronchoscopy, which have been proven to be effective in increasing patient comfort and reducing anxiety. Aromatherapy is a modality widely used in clinical trials to reduce acute procedure anxiety in patients.[1,5,8,9]

In one of the clinical trials using aromatherapy, Mogharab et al examined the effect of lavender essential oils (EO) inhalation on the anxiety of patients undergoing colonoscopy procedures. The patient's anxiety level was assessed from Spielberger's State Anxiety Inventory (STAI) questionnaire that was filled in by the patient before and after the colonoscopy. The results of clinical trials showed that inhalation of lavender EO significantly reduced anxiety levels compared to the control group.[1,5,8,9]

Aromatherapy is a form of complementary and alternative therapy that is simple, non-invasive, low-risk, and cost-effective for reducing acute procedure anxiety. Aromatherapy is the therapeutic use of certain plant EO through skin absorption or inhalation of the olfactory system. Stimulation of the olfactory system

can affect cognitive perception, mood, behavior, and physiological responses of the body. Essential oil is an aromatic oil concentrate extracted from plants by steam distillation, hydro-diffusion, or pressure. Essential oil can be extracted from various parts of plants, including leaves, petals, stems, and roots. Generally, EO is volatile or easily evaporates.[8–12]

Aromatherapy can have an effect through the sense of smell, which is a pathway from the olfactory system to the limbic system, which is the centre of emotion and memory, causing changes in perception, in this case, anxiety. This also explains why specific smells can give rise to perceptions of a situation or trigger memories related to smells. Penetration of EO through the airways has a direct effect on the autonomic nervous system and an indirect effect through neuropharmacological pathways derived from EO components. Direct or indirect effects will affect hypothalamic control of related hormones and neurotransmitters.[13–15]

The olfactory system has a combination coding system to distinguish various odors so that the olfactory receptors are specifically able to distinguish odors. In the corticomedial amygdala via the olfactory tract, the signal will be translated into an olfactory interpretation, and the body's response will appear.[12–15] When the body receives a stimulus as a stressor, there are two pathways for activating responses to the stressor. The first pathway is the sympathetic adrenomedullary system (SAM) or sympathetic nervous system (SNS) phase, which is a response to a short-term stressor characterized by the secretion of adrenaline and noradrenaline, including increased heart rate, blood pressure, sensory perception, and body metabolism. The second pathway, known as the hypothalamic pituitary adrenal (HPA) axis, responds to a more serious and long-term stressor (which lasts more than a few minutes) characterized by secreting cortisol into the bloodstream causing a more significant body response and longer duration.[16–19]

Responses to stressors also affect the brain's neurotransmission system, where GABA receptor activity will increase, accompanied by activation of NMDA antagonist receptors, and decreased serotonin levels. This affects causing the emotional perception of anxiety, which in turn is connected with the HPA axis system in causing metabolic effects, and behavioural responses and can modulate pain. Pain stimulation on bronchoscopy can be modulated through two pathways: the pain response, which is directly captured by the anterior cingulate cortex, then causes the perception of pain.[19–21]

The main components of lavender and orange EO are lynalyl acetate and linalool. The active ingredient EO is an enantiomer of volatile components known to have different psychological and physiological effects. The EO enantiomer has an affinity for binding to serotonin transporters and N-methyl-D-aspartate (NMDA) glutamate receptors. Inhibition of serotonin receptors in the hippocampus

and cingulate cortex influences dopaminergic effects through modulation of the serotoninergic system, resulting in anxiolytic and analgesic effects. NMDA receptor modulation can inhibit nerve excitation, causing a calm, relaxing, anti-agitational effect. Essential oils can also modulate gamma-aminobutyric acid (GABAergic) neurotransmission, especially GABAA receptors and increase the inhibitory tone of the nervous system.[22–27]

Lavender aromatherapy also triggers activation of the parasympathetic nerves and reduces sympathetic nerve activity, thus playing a synergistic role in response to anxiety, including triggering a decrease in heart rate, reducing respiration rate, and lowering blood pressure. This effect can improve somatic symptoms of anxiety.[27,28]

Currently, no studies are related to aromatherapy used in bronchoscopy. This study aims to determine and analyze the effectiveness of anxiolytic aromatherapy in patients undergoing bronchoscopy procedures in controlling and reducing anxiety, respiration rate, pulse rate, and pain.

METHOD

The research design was a quasi-experimental, pretest and posttest design. The research was conducted at RSUD Dr. Moewardi Surakarta from February to March 2020 until the number of samples fulfilled. The study population was patients who underwent bronchoscopy procedures at RSUD Dr Moewardi Surakarta. Sampling carried out by consecutive sampling, namely the selection of research subjects based on inclusion criteria and then included in the study until the required number of subjects fulfilled.

The inclusion criteria were age ≥18 years when sampling, had never undergone a bronchoscopy procedure before, could read and write, and was willing to participate in the study by signing informed consent. Exclusion criteria included total anosmia, allergy to aromatherapy components, history of hypertension and heart disease, taking anti-hypertensive drugs, using anti-anxiety drugs, history of head trauma, impaired consciousness, hemodynamic instability, alcohol or drug dependence, a hearing impairment that hinders verbal communication, cognitive or psychiatric disorders or a history of previous.

Subjects who met the inclusion criteria have explained the aims and objectives of the study. Subjects received education and data recording, including identity, history taking, and physical examination. Study variables (anxiety, respiratory rate, pulse, and pain) assessed twice, namely, the initial assessment, which carried out in the treatment ward, and the second about 30 minutes after the bronchoscopy procedure completed.

Anxiety assessment used the hospital anxiety and depression scale (HADS) questionnaire, respiration rate was assessed by manual calculation, pulse rate was assessed using a pulse oximetry monitor, and pain assessment was assessed using a visual analogue scale

(VAS) for pain. The aromatherapy used is lavender and orange essential oils.

Data analysis was carried out using SPSS version 19 for Windows and data presentation using Microsoft Office 2010. This study used a normality test and a different test for research data. With a meaning limit, P≤0.05 is significant.

RESULTS

The sample population in this study was 45 patients who were divided into three groups, namely the lavender EO aromatherapy treatment group 15 patients, the orange EO aromatherapy treatment group 15 patients, and 15 patients as the control group. The aromatherapy treatment procedure was given in the treatment ward ±1 hour before the bronchoscopy procedure.

Aromatherapy is inhaled through a diffuser placed beside the patient's bed. Both treatment groups received standard bronchoscopy preparation and premedication. The control group did not receive aromatherapy treatment, they only received standard bronchoscopy preparation and premedication procedures.

Characteristics of the subjects in this study consisted of gender, age, education, occupation, diagnosis, bronchoscopy results, and actions during bronchoscopy. A different test on patient characteristics was carried out to determine the homogeneity of the two sample groups as a condition for the feasibility of the experimental procedure.

Table 1 shows that the majority gender was male, with 9 patients (60%) in both the lavender, orange, and control groups. The mean age of patients in the lavender group was 56.80±6.16 years, the orange group was 56.80±6.50 years, and the control group was 55.47±6.20.

The education of patients in the lavender group is junior high school (SMP), namely 7 patients (46.7%). The Orange group is the majority of elementary schools (SD), 9 patients (60.0%), and the control group is the majority of high schools (SMA), 6 patients (40.0%). Most occupations are farmers (40%).

Most bronchoscopy results found compression stenosis. The most common action during bronchoscopy is bronchial washings. There were no significant differences in patient characteristics between the control and treatment groups, which means that the patient characteristics were homogeneous.

There was a decrease in HADS anxiety scores pretest-posttest in the lavender group -2.20±1.21; orange -1.80±1.61; control -1.12±0.83. Based on Table 2, it is known that the results of the different unpaired tests in the value of the post-pre difference obtained a value of P=0.040, which means that there was a significant difference in changes in the HADS score between the 3 groups. To find out the difference in changes in HADS scores between the treatment group and the control group partially (one by one), a post hoc test was carried out.

Table. 1 Basic Characteristics of Research Subject

Characteristic	Control	Lavender	Orange	P
Gender[a]				
Male	9 (60.0%)	9 (60.0%)	9 (60.0%)	1.000
Female	6 (40.0%)	6 (40.0%)	6 (40.0%)	
Age[b]	55.47±6.20	56.80±6.16	56.80±6.50	0.800
Education[c]				
Elemantary	5 (33.3%)	5 (33.3%)	9 (60.0%)	
JHS	4 (26.7%)	7 (46.7%)	4 (26.7%)	0.191
SHS	6 (40.0%)	3 (20.0%)	2 (13.3%)	
Employment[a]				
Laborer	3 (20.0%)	3 (20.0%)	4 (26.7%)	
Trader	1 (6.7%)	1 (6.7%)	3 (20.0%)	
Craftsmen	1 (6.7%)	0 (0.0%)	0 (0.0%)	
Tailor	1 (6.7%)	0 (0.0%)	0 (0.0%)	0.895
Pension	1 (6.7%)	1 (6.7%)	1 (6.7%)	
Farmer	5 (33.3%)	6 (40.0%)	4 (26.7%)	
No Work	3 (20.0%)	4 (26.7%)	3 (20.0%)	
Smoke[a]				
No	6 (40.0%)	7 (46.7%)	8 (53.3%)	0.765
Yes	9 (60.0%)	8 (53.3%)	7 (46.7%)	
Diagnosis[a]				
Lung Abscess	1 (6.7%)	0 (0.0%)	0 (0.0%)	
Pleural Effusion	2 (13.3%)	1 (6.7%)	1 (6.7%)	
Giant bullae sinistra	0 (0.0%)	0 (0.0%)	1 (6.7%)	
Hydropneumothorax	0 (0.0%)	1 (6.7%)	0 (0.0%)	
Mass regio colli	0 (0.0%)	0 (0.0%)	1 (6.7%)	0.790
Metastases ca	2 (13.3%)	2 (13.3%)	1 (6.7%)	
Pneumothorax	1 (6.7%)	0 (0.0%)	1 (6.7%)	
Pyopenumothorax	2 (13.3%)	1 (6.7%)	0 (0.0%)	
Mediastinal Tumour	1 (6.7%)	2 (13.3%)	1 (6.7%)	
Lung Tumour	6 (40.0%)	8 (53.3%)	9 (60.0%)	
Bronchoscopy results				
Endobronchial mass	0 (0.0%)	2 (13.3%)	1 (6.7%)	
Edema of the mucosa	0 (0.0%)	1 (6.7%)	0 (0.0%)	
Infiltrative Mass	2 (13.3%)	0 (0.0%)	1 (6.7%)	0.544
Vocal fold nodules	0 (0.0%)	1 (6.7%)	0 (0.0%)	
Compression Stenosis	6 (40.0%)	6 (40.0%)	8 (53.3%)	
Normal	7 (46.7%)	5 (33.3%)	5 (33.3%)	
Bronchoscopy Procedure				
Rinse	14 (93.3%)	12 (80.0%)	13 (86.0%)	
Rinse, Forceps	0 (0.0%)	2 (13.3%)	1 (6.7%)	0.524
Rinse, Brush	0 (0.0%)	1 (6.7%)	1 (6.7%)	
Rinses, Forceps, Brushes	1 (6.7%)	0 (0.0%)	0 (0.0%)	

Note: [a]nominal categorical data (Chi-square test); [b]normal distributed numeric data (Anova)

Table 2. Tests for Differences in HADS Scores Between the Lavender, Orange Aromatherapy Groups and the Control Group

Group	HADS (Anxiety)			
	Pretest	Postest	P	Deviation
Control	14.93±3.24	13.80±3.10	0.002[d]	-1.13±0 .83
Lavender	14.53±2.85	12.33±2.89	<0.001[c]	-2.20±1.21
Orange	15.40±2.03	13.60±2.56	0.001[c]	-1.80±1.61
P	0.691[a]	0.332[b]	---	0.040[b]

Note: The results of the observations were described with the mean±SD; [a]different test of unpaired groups passing the normality requirement (ANOVA); [b]the unpaired group differential test did not pass the normality requirement (Kruskal-Wallis); [c]the different test of paired groups passed the normality requirement (pair t-test); [d]the different test of paired groups did not pass the normality requirement (Wilcoxon-rank test). Changes are declared significant if the test results in P<0.05.

Table 3. Test of Respiration Rate Differences Between the Lavender, Orange Aromatherapy Groups and the Control Group

Group	Respiration rate			
	Pretest	Post-test	P	Deviation
Control	22.87±1.92	22.93±1.75	0.926[d]	0 .07±1.33
Lavender	23.27±2.02	21.67±1.84	<0.001[c]	-1.60±0.99
Orange	23.13±1.92	21.80±1.61	<0.001[c]	-1.33±0.98
P	0.850[a]	0.096[b]	---	<0.001[a]

Note: The results of the observations were described with the mean±SD; [a]different test of unpaired groups passing the normality requirement (ANOVA); [b]the unpaired group differential test did not pass the normality requirement (Kruskal-Wallis); [c]the different test of paired groups passed the normality requirements (pair t-test; [d]the paired group differential test did not pass the normality requirement (Wilcoxon-rank test). Changes are declared significant if the test results in P<0.05.

Table 4. Pulse Rate Difference Test Between the Lavender, Orange Aromatherapy Group and the Control Group

Group	Pulse			
	Pretest	Post-test	P	Deviation
Control	101.13±9.26	100.00±8.07	0.365[c]	-1.13±4.69
Lavender	93.07±8.15	89.87±8.35	<0.001[c]	-3.20±1.97
Orange	101.00±7.45	97.60±7.49	<0.001[c]	-3.40±2.82
P	0.015 [a]	0.003[a]	---	0.008[b]

Note: The results of the observations were described with the mean±SD; [a]different test of unpaired groups passing the normality requirement (ANOVA); [b]the unpaired group differential test did not pass the normality requirement (Kruskal-Wallis); [c]the different test of paired groups passed the normality requirements (pair t-test; [d]the paired group differential test did not pass the normality requirement (Wilcoxon-rank test). Changes are declared significant if the test results in P<0.05.

Table 5. Pain Score Difference Test Between the Lavender, Orange Aromatherapy Group and the Control Group

Group	Pain Score			
	Pretest	Posttest	P	Deviation
Control	42.00±14.24	46.00±13.52	0.083[d]	4.00±8.28
Lavender	52.67±13.87	42.67±13.35	0.001[d]	-10.00±6.55
Orange	54.67±13.02	45.33±11.87	<0.001[c]	-9.33±5.94
P	0.033[a]	0.698[b]	---	<0.001[b]

Note: The results of the observations were described with the mean±SD; [a]different test of unpaired groups passing the normality requirement (ANOVA); [b]the unpaired group differential test did not pass the normality requirement (Kruskal-Wallis); [c]the different test of paired groups passed the normality requirements (pair t-test; [d]the paired group differential test did not pass the normality requirement (Wilcoxon-rank test). Changes are declared significant if the test results in P<0.05.

Based on the post hoc test on the HADS score, it is known that the comparison of the control HADS score with lavender has a value of P=0.011. Comparison of control with orange P=0.083. The effectiveness differed

significantly between the lavender and orange groups compared to the control group in reducing the HADS score, whereas the aromatherapy treatment of lavender and orange was better at reducing the HADS score. There is no difference in effectiveness between lavender and orange P=0.622.

The difference in changes in the respiration rate of the lavender group pre-post test decreased on average -1.60±0.99; orange 1.33±0.98, while in control, there is an average increase of 0.07±1.33 (Table 3). The post hoc test compared the respiration rate of the control group with lavender with a value of P≤0.001, control compared to orange P=0.001, which means that the aromatherapy treatment group reduced the respiration rate significantly compared to the control group. Compared to the orange group, the lavender group did not differ significantly P=0.515.

The changes in pulse rate changes before the pre-post test showed that the average decrease in the lavender group was -3.20±1.97; orange -3.40±2.82; and control -1.13±4.69. Test different groups paired control group (P=0.365) means that the pulse rate decrease is insignificant. The lavender group P≤0.001, orange P≤0.001, means that the pulse rate decreased significantly in the treatment group (Table 4).

Post hoc test comparison of the pulse rate of the control group with a lavender value of P=0.004, control compared to orange P=0.011 means that the aromatherapy treatment group reduced pulse significantly compared to the control group. The lavender group compared to the orange group did not differ significantly P=0.900.

The pre-post-test pain VAS score in the lavender group -10.00±6.55; orange decreased -9.33±5.94; while in the control group, it increased by 4.00±8.28 (Table 5). Post hoc test comparison of pain VAS scores between the control group and lavender P≤0.001, control compared to orange P≤0.001 means that the aromatherapy treatment group reduced the pain VAS score significantly compared to the control group. Compared to the orange group, the lavender group did not differ significantly P=0.771.

DISCUSSION

This study found a total of 45 patients divided into 3 groups, the lavender aromatherapy treatment group, the group of people, and the control group. The most common sex in each group is male. Based on data from the National Institute of Health in 2019, there is an increase in studies regarding the role of gender in lung disease. The male sex is still dominant, but there is an increasing trend where there is an increase in the number of sufferers in the female sex, especially in chronic lung disease.

Factors that may play a role in this gender disparity include differences in the size of the lung organs in men and women, and differences in levels of the hormones estrogen and testosterone can also be factors that can affect the prevalence of

lung disease. In this study, the most common diagnosis was a lung tumour with suspicion of malignancy. Epidemiologically, lung malignancy also shows the same thing where the incidence in men is greater than in women, but the incidence of lung malignancy in women tends to increase yearly. Similar things, such as exposure to carcinogenic substances in the workplace or possible exposure to indoor air pollution, such as cooking fuel or household dust, can influence the increased incidence of malignancy in women.

The highest level of education varies in the three groups, which can be caused by demographic and cultural factors that are not evenly distributed in Indonesia. Most occupations on research subjects are farmers. According to data from the Central Statistics Agency for 2019, the number of people in Central Java who work in the agricultural sector has reached 5.16 million or around 30% of Central Java's population. Most diagnoses were lung tumours, 53.3% in the treatment group and 40% in the control group. This is in accordance with the findings of bronchoscopy, which is predominantly compression stenosis. There were no significant differences based on subject characteristics in the three groups, which means that the patient characteristics were homogeneous.

The HADS anxiety score of the lavender or orange treatment group significantly decreased compared to the control. The anxiety pretest of all groups averaged 14-15, classified as moderate anxiety. Feelings of ignorance can cause pre-bronchoscopy anxiety because all subjects have never had a bronchoscopy procedure before, so fear and anxiety arise regarding the course of the procedure, the possibility of pain appearing, and fear of the bronchoscopy results. Post-test HADS scores decreased with an average of 12-13 which is still classified as moderate anxiety.[10,21,22]

Even so, a statistically significant decrease in the score showed that aromatherapy in the treatment group effectively reduced HADS anxiety scores. Naturally, anxiety will decrease after the bronchoscopy is completed so that the score decreases in all three groups, but the decrease in the treatment group is statistically significant, while the decrease in the control group is not significant. These results are in accordance with the study of Ghiasi et al through a systematic analysis review that aromatherapy has an anxiolytic effect. Koulivand et al reviewed the effect of lavender aromatherapy on anxiety, where there were improvements in anxiety and mood in patients in ICU care.[10,21,22]

The active ingredients of citrus aromatherapy are similar to lavender, namely linalool and lynalyl acetate. Linalool inhibits acetylcholine release and alters the function of ion channels at the neuromuscular junction. Lynalyl acetate functions as a narcotic and sedative agent. The active substance also has the potential to bind to 5HT-1A receptors in the brain, thereby triggering activation of the autonomic nervous system and HPA axis to change emotional perception and reduce anxiety.[12,22,24]

The respiration rate of the treatment group decreased to the upper limit of normal breathing, which was 20 times/minute, while the control group did not differ from the pretest. Lavender and orange aromatherapy were able to reduce respiration rate better than the control group, where the lavender group compared to the orange had no significantly different effectiveness in reducing respiration rate. These results are in accordance with the study of Slamati et al, who conducted a study on the effect of inhalation aromatherapy on vital signs in ICU patients undergoing open heart surgery, where there were significant differences between the control and treatment groups regarding blood pressure, respiration rate, and pulse.[26–28]

Bikmoradi et al conveyed that inhalation aromatherapy research effectively reduced stress, anxiety, and pain and controlled vital signs in women undergoing cesarean sections. The effect of aromatherapy on the control of respiration rate arises through the work of aromatherapy in the amygdala, thalamus, and cerebral cortex, which triggers the activation of the adrenal glands which regulate the hormones adrenaline and noradrenaline, which results in a decrease in the respiratory rate.[10,11,21,22]

There was a significant decrease in pulse rate in the treatment group, where the pulse rate fell in the normal range of 60-100 beats/minute. In the control group, the pulse rate decreased but not significantly. However, it should be noted that in this study, not all groups were at the same initial or baseline conditions. This is similar to the results of Salamati et al's study, where there was a significant decrease in heart rate in the aromatherapy group compared to controls in patients with open heart surgery. When the patient inhales aromatherapy, there is an increase in blood flow rate and a decrease in systolic blood pressure, which indicates a decrease in parasympathetic nervous activity characterized by a decrease in pulse rate. This is synergistic with the effect of aromatherapy which triggers the activation of the adrenal glands in regulating the hormones adrenaline and noradrenaline.[8,9,11]

The VAS pain score in the treatment group decreased significantly, while the control group had increased pain scores. Pain stimuli can cause an increase in the pain score in the control group during bronchoscopy, which can occur when the device is inserted, or an action is taken. Research by Kim et al states that inhalation aromatherapy can reduce the need for opioid analgesics in postoperative breast biopsy patients. Sasannejad et al's study, stated that aromatherapy could reduce pain in acute migraine patients.[10,21,22]

The analgesic effect of aromatherapy is due to the role of opioidergic neurotransmission in inducing analgesia. Aromatherapy active substances can modulate GABAergic neurotransmission, especially GABAa receptors and increase the inhibitory tone of the nervous system in the anterior cingulate cortex, thereby triggering changes in the perception of pain.[11,22,24]

Limitations of this study include the condition of the subjects at baseline not being in the same condition and not carrying out objective laboratory assessments, such as assessing anxiety by measuring cortisol levels in saliva or other indicators. There is variability in the aromatherapy essential oils used which can be due to differences in species or plant varieties or in the process of making essential oils. Follow-up research accompanied by objective assessments and satisfaction index assessments can be conducted to further confirm the effectiveness of aromatherapy in patients undergoing bronchoscopy.

CONCLUSION

Based on the description above, it can be concluded that aromatherapy with the essential oils of lavender, and orange, is effective in reducing anxiety and controlling respiration rate, pulse, and pain in patients undergoing bronchoscopy procedures. There is no difference in effectiveness between lavender and orange aromatherapy.

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