Frontiers of Nursing • 9(2) • 2022
DOI: 10.2478/fon-2022-0022

sciendo

Frontiers of **Nursing**

Lavender aromatherapy on anxiety and depression in patients with Acute Coronary Syndrome: a single-blind randomized clinical trial

Original Article

Mohammad Nategh[a], Mohammad Reza Heidari[b,*], Abbas Ebadi[c], Reza Norouzadeh[d], Zahra Mohebbinia[e], Bahman Aghaie[f]

[a]*Department of Intensive Care Nursing, Nursing and Midwifery Faculty, Shahed University, Tehran 3319118651, Iran*
[b]*Department of Nursing, Nursing and Midwifery Faculty, Shahed University, Tehran, Tehran 3319118651, Iran*
[c]*Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran 3319118651, Iran*
[d]*Department of Nursing, Nursing and Midwifery Faculty, Shahed University, Tehran 3319118651, Iran*
[e]*School of Nursing, Shiraz University of Medical Sciences, Shiraz 3616493458, Iran*
[f]*Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Qom University of Medical Sciences, Qom 3716993456, Iran*

Received: 30 April 2021; Accepted: 7 June 2021; Published: 20 June 2022

Abstract: **Objective:** In cardiovascular disease, a patient's anxiety and depression can increase cardiac rehabilitation duration and recovery. Lavender aromatherapy as a non-pharmacological intervention effective in other contexts may be an efficient intervention to alleviating anxiety and depression in patients with Acute Coronary Syndrome (ACS).

Methods: In this study, 110 ACS patients were randomly assigned to two intervention and control groups. Inhalation of the lavender fragrance was prescribed for the intervention group and the drop of aromatic almond for the control group for 3 days.

Results: The first-day anxiety and depression were significantly different in the two groups at 1 h and 9 h after the intervention. The 'morning's difference before the intervention was not significant, but it was substantial 1 h after the intervention. On the third morning of the intervention, this difference was confirmed.

Conclusions: This study confirmed the effectiveness of lavender aromatherapy in reducing anxiety and depression in ACS patients. This 'study's results enable intensive care nurses to use aromatherapy with lavender oil as a non-pharmacological and cost-effective intervention to reduce their psychological tensions and increase patient satisfaction during hospitalization in the cardiac care units (CCU).

Keywords: *anxiety • aromatherapy • Acute Coronary Syndrome • depression • lavender • randomized clinical trial*

How to cite this article: Nategh M, Heidari MR, Ebadi A, Norouzadeh R, Mohebbinia Z, Aghaie B. Lavender aromatherapy on anxiety and depression in patients with Acute Coronary Syndrome: a single-blind randomized clinical trial. *Front Nurs*. 2022;2:233–240.

* *Corresponding author.*
E-mail: mheidari@shahed.ac.ir (M. -R. Heidari).

1. Introduction

Cardiovascular disease is a major cause of mortality in all countries. Extreme emotional stress situations such as anxiety or depression are linked to increased cardiovascular health risk.[1,2] In Acute Coronary Syndrome (ACS) patients with depression and anxiety, the risk of death is increased.[3] ACS patients who are admitted to the cardiac care units (CCU) frequently suffer from depression and anxiety. Recognizing these symptoms on admission is the key factor in the management of the disease.[4] Depression and anxiety have been shown to increase mortality and morbidity and reduce health-related quality of life among patients with cardiovascular disease.[5–7] Anti-anxiety and depression medications need to be prescribed by a physician.[5] For example, antidepressant drugs in ACS patients are accompanied by adverse effects such as increased myocardial infarction (MI) and dysrhythmias.[8] Benzodiazepines provide excellent effect against amnesia and cardiovascular safety, but they can cause significant hypotension in hemodynamic instability patients.[9] Also, narcotics may have serious side effects such as respiratory depression, vomiting, urinary retention, and ileus.[6] In addition to drug treatments for these patients, complementary therapies such as hydrotherapy, humor, illustration, massage, music, and relaxation can be used successfully as an alternative intervention.[7]

Aromatherapy is the use of essential volatile oils [10]or aromas extracted from plants for therapeutic purposes.[11] One of the most widely used essential oils in aromatherapy is lavender. Lavender has long been used as traditional medicine.[12] Lavender is one of >20 herbs with antidepressant and anti-anxiety properties.[13] A decrease in anxiety or depression has been reported in different studies following lavender prescription.[5, 14–17] Also, aromatherapy with lavender has been studied in episiotomy, 'Alzheimer's, Parkinson's, and cancer patients due to its sedative, hypnotic, antioxidant, and anti-inflammatory effects.[16, 18]

On the other hand, inhaled aromatherapy has a relaxant and antispasmodic effect.[19] So it is helpful in symptom management of Gillian Barra disease.[12] Lavender oil also has positive effects on reducing anxiety and stress when removing sheath in patients after coronary angiography.[20] Also, studies show that lavender scent has positive effects on anxiety and depression in chemotherapy and hemodialysis patients.[21,22] Given the public interest in herbal medicine in recent years, this study aimed to investigate the effects of lavender essential oil on anxiety and depression in patients with ACS who are admitted to the CCU.

2. Methods

2.1. Study design

This study is a single-blind randomized clinical trial in two groups in 2019 in the critical care unit of Namazi Hospital in Shiraz, Iran.

2.2. Participants and sample size

This study investigated the effect of Lavender aromatherapy for alleviating anxiety and depression in patients with ACS. Participants were interviewed in different working shifts on the days of the week, and patients were selected if they were on the first day of admission in CCU. Considering 95% confidence interval, β = 80%, and the attrition bias, 55 subjects were enrolled in each group (*N* = 110).

2.3. The inclusion criteria

The inclusion criteria were having a Hospital Anxiety and Depression Scale (HADS) score of >7, diagnosis of ACS, not using pacemakers, not using other complementary treatment (herbal remedies, traditional, or other therapies) in the previous week, no history of psychiatric disorders or being treated for anxiety and depression, no addiction, no history of asthma, eczema, and allergies to plants or any seasonal sensitivity, lack of olfactory disorders, and lack of cognitive deficits. Exclusion criteria included the grade 3 or 4 of heart failure and non-cardiac stressful situations (Figure 1). The data collection instrument was the demographic and clinical data sheet and HADS.

2.4. Randomisation and blinding

Patients were allocated into the intervention group based on drawn numbers (i.e., odd) and in the control group (i.e., even). The trained nurse who performed the intervention collected the data before and after the intervention and the patients were blind to the group allocations. Also, due to the rapid spread of the scent of lavender in the environment, the intervention was conducted at two completely separate CCU with quite similar physical conditions in the hospital for each group.

2.5. Intervention

The duration of the intervention was 3 days for each patient, twice daily (morning and evening). After the first day of admission to the CCU and a half-hour before the intervention, HADS were filled out by

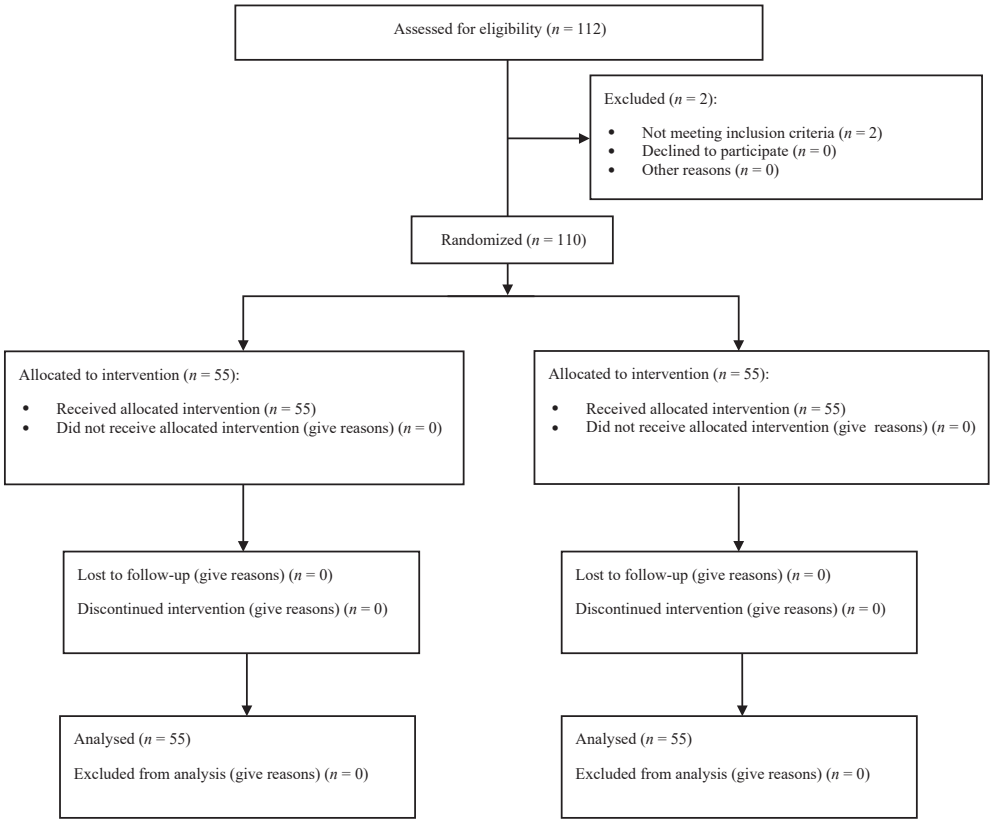

Figure 1. Consort flow diagram.

patients (about 11 am). Then two drops of English lavender essence were dropped on non-absorbent three-ply tissue paper attached to the patient's shirt collar, and he/she was asked to breathe normally for 20 min.[5,17] Then an hour later, the scale was completed for the second time. According to the previous studies, the mean effect time of lavender essential oil on anxiety was considered 9 h after the first prescription.[17,23] Therefore, the tools were also completed after 8 h of intervention (at about 8 pm). Another prescription was at 10 pm, and HADS was given to the patients at 7 am the following days. This procedure was repeated the next day, and the measurements were performed at the end of the second day and in the morning of the third day. Depression and anxiety levels were measured seven times in 3 days by the HADS. In the control group, the aromatic almond oil was prescribed instead of lavender essential oil at a similar time as the intervention group.

2.6. Measurement

The HADS is a self-report scale with 14 items designed to screen the presence and severity of patients' anxiety and depression symptoms during the previous week. This scale takes <5 min to answer, and so it was suitable for the samples. The HADS has two subscales, including anxiety and depression, each of which comprises items rated on 4-point Likert scales. The total score between 0 and 42 with 0–14 was considered low, 15–28 considered moderate, and 29–42 were considered high. For each subscale (anxiety and depression), the scores ranged between 0 and 21, where 0–7 was considered low, 8–14 being moderate, while 15–21 was considered high.[24] The Iranian version of HADS has acceptable reliability and validity to measure psychological distress among cancer patients.[25] Afshar et al.[26] in the study of depression and anxiety in Iranian elderly with heart failure, the reliability coefficient for HADS was calculated to be 0.73. Moradian et al.[27] also used this questionnaire as a valid and reliable scale to measure anxiety and depression in coronary artery disease in Iran.

Lavender essential oil is prepared by the Department of Medicinal Plants Research Laboratory (Tehran University of Medical Sciences). To ensure its compound purity, the accuracy tests were performed by chromatography and mass spectrometry analyses.

2.7. Data analyses

Data analyses were conducted by statistical Package for Social Sciences (SPSS, v.16) using descriptive statistics (frequency, mean, standard deviation) and analytic tests (Chi-squared, *t*-test, and repeated measures Analysis of Variance (ANOVA). The $P < 0.05$ was considered statistically significant.

2.8. Ethical consideration

Necessary permissions were obtained from the Medical Ethics Committee of Shahed University (No. 41/175283) in Tehran, Iran. The researchers introduced him to patients, and written consent was obtained. Informed the study samples from the study's aim, being free to withdraw from the study at any time, the confidentiality of personal information, and the lack of adverse effects of Lavender essential oil.

3. Results

Of the 110 patients, 52 patients (47/3%) were male and 58 were female (52/7%), and in that 55 patients (50%) were in the placebo group and 55 patients (50%) were in the control group. Two patients were excluded from the study due to allergies to essential oils. There was no statistically significant difference between the two groups by gender, marital status, education, job, smoking, history of allergy, using complementary treatment before the intervention, underlying disease, previous hospitalization to CCU (Table 1). The results of repeated measures ANOVA showed no significant differences in the mean of depression between the two groups before the intervention. But an hour after the intervention, there were significant differences ($P = 0.01$), and after 9 h, the difference decreased significantly ($P = 0.025$), (Figure 2). However, there was no significant difference in the mean of depression between control and intervention groups after intervention on the following day ($P = 0.28$). The results showed significant differences in the measurements on the second and third days. Also, the sequential changes in anxiety were similar to depression changes (Table 2). The first-day anxiety and depression were significantly different in the two groups in 1 h ($P = 0.001$) and 9 h ($P = 0.01$) after the intervention. The difference in the morning before the intervention was not significant ($P = 0.13$), but it was significant 1 h after the intervention ($P = 0.001$). This difference ($P = 0.002$) was confirmed on the third morning of the intervention (Figure 3).

Group	Intervention, *N* (%)	Control *N*, (%)	*P*-value
Gender			0.09
Male	43.6	50.9	
Female	56.4	49.1	
Marital status			0.3
Single	21.8	10.9	
Married	52.7	54.5	
Widow	21.8	25.5	
Divorced	3.6	9.1	
Education			0.08
Literacy reading and writing	36.4	29.1	
Under high school diploma	20.0	18.2	
Diploma	18.2	20	
Academic	21.8	12.7	
Illiterate	3.6	20	
Job			0.8
Employee	16.4	12.7	
Retired	16.4	10.9	
Homemaker	25.5	27.3	
Self-employed	25.5	30.9	
Other	10.9	9.1	
Underlying disease			0.7
DM	7.3	7.3	
HTN	16.4	23.6	
Hypercholesterolemia	7.3	9.1	
Rheumatic diseases	0	1.8	
MI	10.9	12.7	
CVA	5.5	1.8	
CABG	5.5	3.6	
History of hospitalization			0.4
Yes	41.8	34.5	
No	58.2	65.5	

Note: CABG, coronary artery bypasses grafting; CVA, cerebrovascular accident; DM, diabetes mellitus; HTN, hypertension; MI, myocardial infarction; $P < 0.05$.

Table 1. Demographic characteristics of the intervention and control groups.

4. Discussion

This study investigated the effect of lavender aromatherapy on anxiety and depression among patients with ACS. The results confirm the effect of lavender on depression in patients with ACS. In this study, more reduction in depression was seen 1 h after the intervention; this finding can be related to this herb's immediate absorption and rapid effect. The rate of depression was >9 h after the intervention. Considering the depression rate in both intervention and control groups, we found rapid and sudden decline from Time 1 to Time 2 in the control group. Moving closer to the second time, the changes became slower. The second time measurements did not show a significant difference

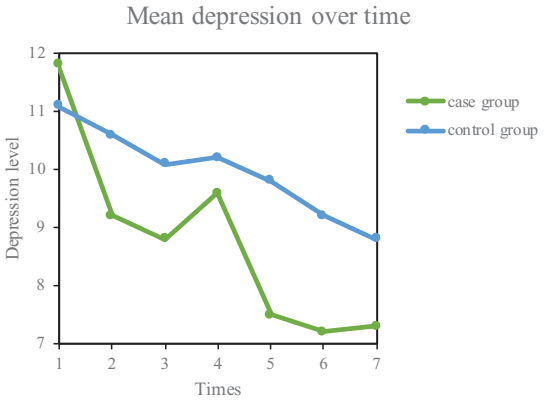

Figure 2. Time trend of mean depression in the intervention and control groups.

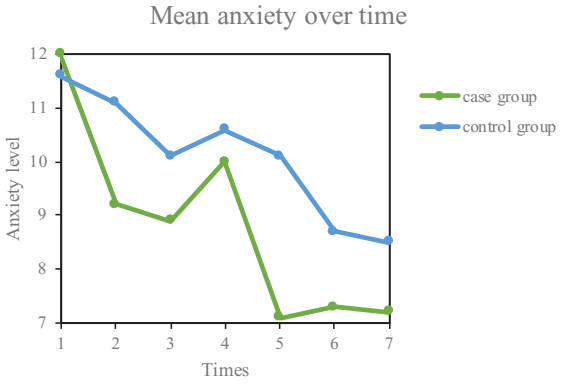

Figure 3. Time trend of mean anxiety in the intervention and control groups.

Measurement times	Intervention	Control	*P*-value
Depression			
Before the first intervention	11.6 ± 3	11.1 ± 2.8	0.35
1 h after the first intervention	9.2 ± 3.1	10.5 ± 2.6	0.01
9 h after the first intervention	8.8 ± 3.04	10.1 ± 2.6	0.025
The second morning before the second intervention	9.6 ± 2.9	10.2 ± 3.02	0.28
1 h after the second intervention	7.4 ± 2.9	9.8 ± 2.76	0.001
9 h after the second intervention	7.1 ± 3.01	9.2 ± 2.6	0.001
Third day morning	7.3 ± 3.06	8.6 ± 2.5	0.01
P-value	0.001	0.001	0.017
Anxiety			
Before the first intervention	11.9 ± 3.4	11.5 ± 2.6	0.49
1 h after the first intervention	9.2 ± 3.4	11.03 ± 2.8	0.003
9 h after the first intervention	8.9 ± 3.2	10.10 ± 2.7	0.025
The second morning before the second intervention	10.03 ± 3.07	10.6 ± 2.6	0.28
1 h after the second intervention	7.14 ± 3.02	10 ± 2.6	0.001
9 h after the second intervention	7.21 ± 3.02	8.74 ± 2.6	0.006
Third day morning	7.16 ± 2.7	8.49 ± 2.4	0.009
P-value	0.001	0.001	0.023

Table 2. Comparison of depression and anxiety in the intervention and control groups before and after the intervention.

by the third time measurement, and vice versa. This change is slightly increased from the second to fourth measurements. As the results, measured changes were not significant between Time 4 and Time 2 but 1 h after the second day of the intervention. The changes were steeper compared with the first day, so it came closer to the baseline of depression score. Another finding was a highly significant difference between Time 4 and Time 5. This sequence of changes can be explained by the effects of herbal essence in different parts of the brain, specifically signaling pathways from the olfactory system to the central nervous system by molecular elements of aromatherapy and stimulation effects of neurotransmitters (e.g., serotonin and dopamine) to further regulating mood.[28] As seen in the results, the mean changes in depression were very slow after Time 5 in the intervention group. But, in the control group, the declining trend was observed from the beginning to the end of the intervention. These findings imply the intervention groups have been reached the baseline of depression compared with the control group.

The findings indicate that aromatherapy inhalation significantly reduced anxiety and depression in patients with ACS. There are some investigations consistent with this study. For example, Hwang [23] found that aromatherapy with lavender essential oil effectively reduced anxiety.[23] Cooke and Ernst[29] reported that inhalation of essential oils might reduce anxiety. Kim et al.[30] and Liu et al.[31] lavender is effective in relieving stress. Fissler and Quante[32] determined the effectiveness of lavender in patients with symptoms of anxiety, insomnia, and psychomotor agitation. Teymour et al. in determining the effects of inhalation of lavender essential oil on stress and anxiety during sheath take out in patients after coronary angiography show anxiety and stress in the lavender aromatherapy group are lower than the control group. However some studies such as in Louis and Kowalski's study, there was no improvement in cancer hospice patients' anxiety levels after lavender oil aromatherapy.[33]

5. Conclusions

This study confirms the effectiveness of lavender aromatherapy in reducing anxiety and depression in ACS patients. This study's results enable intensive care nurses to use aromatherapy with lavender oil as a non-pharmacological and cost-effective intervention to reduce their psychological tensions and increase patient satisfaction during hospitalization in the CCU.

Acknowledgment

Many thanks to Nemazi Hospital's diligent staff for their cooperation in this study. We would like to thank all the patients who participated in this study. Also, the researcher would like to thank the unsparing efforts of Dr. Reza Ghorbani a faculty member of Medical Sciences, Shiraz. Also, the authors would like to thank Dr. Nasrin Shokrpour at the Center for Development of Clinical Research of Nemasi Hospital for editorial assistance.

Ethical approval

This study was approved by the Medical Ethics Committee of Shahed University (No. 41/175283) in Tehran, Iran.

Conflicts of interest

All contributing authors declare no conflicts of interest.

References

1. Frasure-Smith N, Lesperance F. Depression and anxiety as predictors of 2-year cardiac events in patients with stable coronary artery disease. *Arch Gen Psychiatry*. 2008;65:62–71.
2. Park JH, Tahk SJ, Bae SH. Depression and anxiety as predictors of recurrent cardiac events 12 months after percutaneous coronary interventions. *J Cardiovasc Nurs*. 2015;30:351-359.
3. Shah AJ, Ghasemzadeh N, Zaragoza-Macias E, et al. Sex and age differences in the association of depression with obstructive coronary artery disease and adverse cardiovascular events. *J Am Heart Assoc*. 2014;3:e000741.
4. Shimizu Y, Suzuki M, Okumura H, Yamada S. Risk factors for onset of depression after heart failure hospitalization. *J Cardiol*. 2014;64:37–42.
5. Fayazi S, Babashahi M, Rezaei M. The effect of inhalation aromatherapy on anxiety level of the patients in preoperative period. *Iran J Nurs Midwifery Res*. 2011;16:278–283.
6. Huffman JC, Beach SR, Suarez L, et al. Design and baseline data from the Management of Sadness and Anxiety in Cardiology (MOSAIC) randomized controlled trial. *Contemp Clin Trials*. 2013;36:488–501.
7. Keegan L. Therapies to reduce stress and anxiety. *Crit Care Nurs Clin North Am*. 2003;15:321–327.
8. Huffman JC, Celano CM, Januzzi JL. The relationship between depression, anxiety, and cardiovascular outcomes in patients with acute coronary syndromes. *Neuropsychiatr Dis Treat*. 2010;6:123–136.
9. Darrouj J, Karma L, Arora R. Cardiovascular manifestations of sedatives and analgesics in the critical care unit. *Am J Ther*. 2009;16:339–353.
10. Tillett J, Ames D. The uses of aromatherapy in women's health. *J Perinat Neonatal Nurs*. 2010;24:238–245.
11. Walsh ME, Reis D, Jones T. Integrating complementary and alternative medicine: Use of essential oils in hypertension management. *J Vasc Nurs*. 2011;29:87–88.
12. Tayarani-Najaran Z, Amiri A, Karimi G, Emami SA, Asili J, Mousavi SH. Comparative studies of cytotoxic and apoptotic properties of different extracts and the essential oil of Lavandula angustifolia on malignant and normal cells. *Nutr Cancer*. 2014;66:424–434.
13. Szafranski T. Herbal remedies in depression – state of the art. *Psychiatr Pol*. 2014;48:59–73 (in Polish).
14. Fontaine DK, Briggs LP, Pope-Smith B. Designing humanistic critical care environments. *Crit Care Nurs Q*. 2001;24:21–34.
15. Keegan L. Alternative and complementary modalities for managing stress and anxiety. *Crit Care Nurse*. 2000;20:93–96.
16. Sheikhan F, Jahdi F, Khoei EM, Shamsalizadeh N, Sheikhan M, Haghani H. Episiotomy pain relief: use of lavender oil essence in primiparous Iranian women. *Complement Ther Clin Pract*. 2012;18:66–70.
17. Shirreffs CM. Aromatherapy massage for joint pain and constipation in a patient with Guillian Barre. *Complement Ther Nurs Midwifery*. 2001;7:78–83.

18. Shiina Y, Funabashi N, Lee K, et al. Relaxation effects of lavender aromatherapy improve coronary flow velocity reserve in healthy men evaluated by transthoracic doppler echocardiography. *Int J Cardiol*. 2008;129:193–197.
19. Lee YL, Wu Y, Tsang HWH, Leung AY, Cheung WM. A systematic review on the anxiolytic effects of aromatherapy in people with anxiety symptoms. *J Altern Complement Med*. 2011;17:101–108.
20. Teymouri F, Rajai N, Farsi Z, Pourmirzai M. The effects of inhaling lavender fragrance on stress and anxiety during sheath take out in patients after coronary angiography. *J Med Plants*. 2020;18:78–89.
21. Bagheri-Nesami M, Shorofi SA, Nikkhah A, Espahbodi F. The effects of lavender essential oil aromatherapy on anxiety and depression in haemodialysis patients. *Pharm Biomed Res*. 2017;3:8–13.
22. Özkaraman A, Dügüm Ö, Yılmaz HÖ, Yeçilbalkan ÖU. Aromatherapy: the effect of lavender on anxiety and sleep quality in patients treated with chemotherapy. *Clin J Oncol Nurs*. 2018;22:203–210.
23. Hwang JH. The effects of the inhalation method using essential oils on blood pressure and stress responses of clients with essential hypertension. *Taehan Kanho Hakhoe Chi*. 2006;36:1123–1134 (in Ko).
24. Eng HS, Yean LC, Das S, et al. Anxiety and depression in patients with coronary heart disease: a study in a tertiary hospital. *Iran J Med Sci*. 2011;36:201–206.
25. Montazeri A, Vahdaninia M, Ebrahimi M, Jarvandi S. The Hospital Anxiety and Depression Scale (HADS): translation and validation study of the Iranian version. *Health Qual Life Outcomes*. 2003;1:14.
26. Afshar PF, Bastani F, Haghani H, Valipour O. Hospital anxiety and depression in the elderly with chronic heart failure. *Iran J Nurs*. 2019;32:80–89.
27. Moradian ST, Ebadi A, Saeid Y, Asiabi M. Hospital anxiety and depression in patients with coronary artery disease. *Iran J Psychiatric Nurs (IJPN)*. 2013;1:54–61.
28. Lv XN, Liu ZJ, Zhang HJ, Tzeng CM. Aromatherapy and the central nerve system (CNS): therapeutic mechanism and its associated genes. *Curr Drug Targets*. 2013;14:872–879.
29. Cooke B, Ernst E. Aromatherapy: a systematic review. *Br J Gen Pract*. 2000;50:493–496.
30. Kim S, Kim HJ, Yeo JS, Hong SJ, Lee JM, Jeon Y. The effect of lavender oil on stress, bispectral index values, and needle insertion pain in volunteers. *J Altern Complement Med (New York, NY)*. 2011;17:823–826.
31. Liu SH, Lin TH, Chang KM. The physical effects of aromatherapy in alleviating work-related stress on elementary school teachers in taiwan. *Evid Based Complement Altern Med*. 2013;2013:853809.
32. Fissler M, Quante A. A case series on the use of lavendula oil capsules in patients suffering from major depressive disorder and symptoms of psychomotor agitation, insomnia and anxiety. *Complement Ther Med*. 2014;22:63–69.
33. Louis M, Kowalski SD. Use of aromatherapy with hospice patients to decrease pain, anxiety, and depression and to promote an increased sense of well-being. *Am J Hosp Palliat Care*. 2002;19:381–386.