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The effects of lavender essential oil aromatherapy on anxiety and depression in haemodialysis patients

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Abstract

This study was intended to examine the effects of lavender essential oil aromatherapy on anxiety and depression in haemodialysis patients. This randomised clinical trial was conducted on 72 haemodialysis patients divided into control and experimental groups. The control group only received the routine care. The experimental group received aromatherapy with 3 drops of lavender essential oil 5% for 10 minutes every time they underwent haemodialysis for a period of one month. Anxiety and depression were measured in both groups at baseline and by the end of the second and fourth weeks during the first hour of a dialysis session. The rANOVA showed no significant difference between the two groups in terms of the severity of anxiety before the intervention and by the end of the second and fourth weeks ($p = 0.783$). However, the rANOVA revealed a significant difference with respect to the severity of depression between the two groups ($p = 0.005$). Current research suggests that we need various concentrations of lavender essential oil to relieve anxiety compared to depression. In sum, future studies are required to investigate different concentrations of lavender essential oil at different times during haemodialysis sessions to obtain specific doses for lavender essential oil to be used on haemodialysis patients suffering from anxiety and depression.

Keywords: Aromatherapy, lavender, anxiety, depression, haemodialysis

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Introduction

Anxiety is one of the disorders found in dialysis patients, which is associated with behavioral, psychological, physical and mental symptoms. Illness and changes in professional, marital, family and social life cause anxiety in these patients. Most dialysis patients constantly suffer from anxiety and distress about their financial issues, sexual dysfunction, family responsibilities, and lack of independence (1). The prevalence of anxiety disorders varies in dialysis patients, with different figures having been reported in relevant studies. A study by Cukor *et al.* reported 27% of hemodialysis patients had a current major anxiety disorder (2). In Iran studies have reported the prevalence of anxiety disorders in haemodialysis patients to be about 52% (3,4). Studies indicate anxiety disorders to be one of the contributing factors to suicidal behaviors in these patients and suggest a strong relationship between anxiety and reduced quality of life (5,6).

Depression is another disorder found in haemodialysis patients. Depression is associated with anhedonia, sorrow, helplessness, espair, guilt, sleep disturbances, decreased appetite, and sexual desire disorders (7). The prevalence of depression is higher among dialysis patients than the general population (8). In Iran, the prevalence of depression in haemodialysis patients is reported to be about 65% (3, 4). Factors associated with depression include transplant history, duration of haemodialysis, level of income, and occupation (3). Depression could reduce health-related quality of life (9) and increase risk of mortality in hemodialysis patients (10).Antidepressants can cause a number of complications in haemodialysis patients, as these medications can bind to proteins, do not have a favorable renal clearance and can produce toxic metabolites (11). In addition, some antidepressants, such as tri-cyclics can cause cardiovascular complications, including dysrhythmias, prolongation of QT interval and orthostatic hypotension (12).

Due to concerns about drug-induced side effects in these patients, alternative non-pharmacological interventions need to be considered. A review of literature revealed that some of these interventions include exercise therapy (13,14) and

behavior therapy (15). Aromatherapy is a complementary therapy, which benefits from essential oils to manage some problems related to haemodialysis (16-18). One of the essential oils used in aromatherapy comes from lavandula, more commonly known as lavender. This flowering plant is from the Lamiaceae family (19). Linalool and linalyl acetate found in lavender can stimulate parasympathetic system that influences mood states, resulting in feeling better and fresher, and being more active and relaxed (20). Shaw et al. showed that inhaled linalool has anxiolytic properties in mice (21). Various studies have been conducted on the medicinal properties of lavender essential oil, including sedative effects (22), sleep-inducing property, anxiolytic (23) and anti-fatigue effects (24,25).The duration of treatment and lack of supportive systems lead to patients' inability to cope with anxiety and depression. In addition to negative effects on quality of life, anxiety and depression also increase treatment costs incurred by patients. The present study thus aims to examine the effects of lavender essential oil aromatherapy on anxiety and depression in haemodialysis patients.

Materials and method

This is a randomized clinical trial conducted in two hospitals affiliated to Mazandaran University of Medical Sciences in Sari, Iran. The study population consisted of haemodialysis patients who entered the study if they met the following eligibility criteria: be willing to participate in the study, be treated with dialysis for a minimum of 6 months (26), be undergoing dialysis 3 times a week, be of 18 years old and over, be conscious, have the ability to verbally communicate, have an uncompromised sense of smell (27), not experienced stressful events in the last 6 months (including the death of a loved one), not prescribed tranquilizers, and have no history of hospitalization due to psychiatric disorders (26). Exclusion criteria include patients with a history of allergies and acute respiratory diseases, kidney transplant candidates, pregnant women, and women intending to get pregnant during the time of the trial (27). The sample size was calculated as 76 (38 in each group) according to the mean and standard deviation of trait anxiety before (44 ± 9.7) and four weeks after (36.8 ± 7.9) the intervention found in a study conducted by Kanaani et al. (26), and 95% the confidence coefficient, with consideration of the likelihood of patient drop-out during the study. Eligible patients were randomly allocated in two groups using the Excel RANDBETWEEN function.

The procedure and the purpose of the study were initially explained to the participants. Written consent was consequently obtained from eligible patients and they were also assured of anonymity and confidentiality of personal data. Socio-demographic characteristics and medical factors were collected using a questionnaire, which included age, gender, marital status, underlying diseases and history of haemodialysis. The Hospital Anxiety and Depression Scale (HADS) were used to assess the presence and severity of anxiety and depression in haemodialysis patients. HADS is a screening tool to identify emotional distress (28). This scale has been used in several studies to measure the severity of anxiety and depression in haemodialysis patients (29-32). The scale has 14 items, including two subscales, anxiety and depression. Each subscale contains 7 items (anxiety- items1, 3, 5, 7, 9, 11 and 13; depression- items 2, 4, 6, 8, 10, 12 and 14) (33). Items are scored on a 4-point scale ranging from 0 to 3, with a total score of 21. The scores are categorized as normal (0-7), borderline (8-10), and abnormal (11-21) (34). The validity and reliability of the HADS scale has been established in a number of studies. For instance, Montazeri *et al.* found the internal consistency of the HADS scale to be 0.78 for anxiety and 0.86 for depression using Cronbach's alpha coefficient (35).

The experimental group underwent aromatherapy with lavender (angustifolia) essential oil procured from the Barij Essence Pharmaceutical Company, lab accreditation *ISIR-ISO/IEC 17025*. The experimental-group patients inhaled lavender essence on their dialysis days over a period of 4 weeks. A cotton ball infused with 3 drops of lavender essential oil 5% (diluted 1:20 with sweet almond oil) was attached to the patients' collar and they were then asked to breathe normally for 10 minutes (36). The control-group patients only received routine care. Anxiety and depression were measured at baseline and by the end of the second and fourth weeks (26) during the first hour of a dialysis session. The collected data were coded and statistically analyzed with SPSS (Statistical Package for Social Science, v.20) using descriptive statistics (mean, percentage, standard deviation) and analytical tests [independent-samples t- test, repeated measures analysis of variance (rANOVA) and Chi-square test]. P values less than 0.05 were considered as significant.

Results

The mean age of the patients was 61.48 ± 14.40 years (range, 57 years) for the experimental group and 58.91 ± 12.84 years (range, 55 years) for the control group. The independent-samples t-test did not show a significant difference between the two groups in terms of the mean age of the patients (p = 0.42). In addition, the majority of experimental (65.70%) and control (75%) groups were men. According to the Chi-square test (p = 0.504), no significant differences were observed between the two groups for gender. The mean duration of chronic renal failure was 72.14 ± 12.13 months for the experimental group and 77.67 ± 9.71 months for the control group. Moreover, the mean duration of dialysis was 39.54 ± 5.64 months for the experimental group and 42.62 ± 4.37 months for the control group. The independent- samples t-test

revealed that there were no significant differences between the two groups for the duration of chronic renal failure ($p = 0.35$) or the duration of dialysis ($p = 0.71$). The socio-demographic and clinical characteristics of the participants are presented in Table 1.

The range of anxiety and depression score with HADS scale was frequently between 0 to 7 in each group before the intervention (Table 2). The mean anxiety score was 4.42 ± 4.04 in the experimental group and 4.75 ± 4.39 in the control group at baseline (before the intervention). The independent-samples t- test showed no significant difference between the two groups in their level of anxiety ($p = 0.742$) at baseline. The experimental group had a lower level of anxiety (3.71± 3.95) in comparison to the control group (4.55 ± 4.19) two weeks after the intervention. However, the experimental group had a higher level of anxiety (3.77 ± 4.1) compared to the control group (3.69 ± 4.14) four weeks after the intervention. Moreover, the rANOVA demonstrated that the differences between the two groups in their level of anxiety before, two and four weeks after the intervention were not statistically significant (Table 3).

The mean depression score was 4.54 ± 4.11 in the experimental group and 4.05 ± 4.48 in the control group before the intervention. The independent-samples t-test showed no significant difference between the two groups in their level of depression at baseline (before the intervention) ($p = 0.631$). The experimental group had a lower level of depression

Table 1 Socio-demographic and clinical characteristics of haemodialysis patients

Variable \ Group	Experimental group	[N(%)]	Control group	[N(%)]
Gender	Male	23 (65.7%)	Male	27 (75%)
	Female	12 (34.3%)	Female	10 (25%)
Underlying Disease	Diabetes	6 (17.1%)	Diabetes	5 (13.5%)
	Hypertension	8 (22.9%)	Hypertension	12 (32.4%)
	Diabetes and Hypertension	12 (34.3%)	Diabetes and Hypertension	10 (27.1%)
	None	5 (14.3%)	None	5 (13.5%)
	*Other	4 (13.4%)	*Other	5 (13.5%)
Place of Residence	Metropolitan areas	25 (71.4%)	Metropolitan areas	20 (55.6%)
	Rural areas	10 (28.6%)	Rural areas	17 (44.4%)
Marital status	Married	31 (88.6%)	Married	32 (86.1%)
	Single	1 (2.9%)	Single	3 (8.3%)
	Widow	3 (8.6%)	Widow	2 (5.6%)

Table 2 Frequency of anxiety and depression score in experimental and control groups before study

Score \ Group	Experimental Frequency (%)	Control Frequency (%)
Anxiety		
0-7	25 (7.4%)	28 (25.7%)
8-10	7 (20%)	5 (13.5%)
11-21	3 (8.6%)	4 (10.8%)
Depression		
0-7	27 (77.1%)	30 (81.1%)
8-10	5 (14.3%)	1 (2.7%)
11-21	3 (8.6%)	6 (16.2%)

Table 3 Intensity of anxiety before, two and four weeks after intervention

Anxiety \ Group	Experimental group (mean ± SD)	Control group (mean ± SD)	rANOVA
Before tervention	4.42 ± 4.04	4.75 ± 4.39	F = 0.783 P = 0.245
Two weeks after intervention	3.71 ± 3.95	4.55 ± 4.19	
Four weeks after intervention	3.77 + 4.10	3.69 + 4.14	
rANOVA	F = 0.972 P = 0.383	F = 0.136 P = 0.873	

(3.11 ± 3.06) compared to the control group (5.00 ± 5.13) two weeks after the intervention. Four weeks after the intervention, the experimental group experienced a lower level of depression (3.82 ± 4.07) than the control group did (4.27 ± 5.04). The statistical analysis (rANOVA) also showed that significant differences existed between the two groups with respect to depression levels before, two and four weeks after the intervention (p = 0.005) (Table 4).

Table 4 Comparison of the intensity of depression at baseline and 2 and 4 weeks after the intervention

Group / Depression	Experimental group (mean ± SD)	Control group (mean ± SD)	rANOVA
Before intervention	4.54 ± 4.11	4.05 ± 4.48	F = 5.62 P = 0.005
Two weeks after intervention	3.11 ± 3.06	5.00 ± 5.13	
Four weeks after intervention	3.82 ± 4.07	4.27 ± 5.04	
rANOVA	F = 4.45 P = 0.019	F = 1.57 P = .221	

Discussion

The present study showed that the severity of anxiety did not differ significantly between the two groups before, two and four weeks after the intervention. However, the two groups differed significantly in the severity of depression before, two and four weeks after the intervention. The effects of different concentrations of lavender essential oil on anxiety and depression have been examined in a number of studies, yielding conflicting results. With respect to anxiety levels, our results are comparable to those of Muzzarelli *et al.* evaluated the effects of inhalation with lavender essential oil 10% for 5 minutes on anxiety prior to a scheduled colonoscopy or esophagogastroduodenoscopy. The control group was given inert oil (placebo) for inhalation. They found that aromatherapy had no effects on the level of anxiety in patients scheduled for colonoscopy or esophagogastroduodenoscopy (37). Consistent with our study, Muzzarelli et al. used diluted lavender essential oil. Shiina *et al.* investigated the effects of diluted lavender essential oil on blood pressure in effects on blood pressure (38). Furthermore, Choi examined differences between lavender abdominal massage and inhalation on dysmenorrhea, menstrual pain, anxiety and depression in female students. Lavender essential oil diluted in almond oil was used in the abdominal massage group, and a necklace infused with lavender essential oil was used in the other group Choi found no significant differences between the two groups in the level of anxiety and depression (39). To produce more accurate results, Choi's study should have had a third group serving as a control. In addition, Louis and Kowalski measured vital signs, pain, anxiety, depression and sense of well-being in 17 cancer hospice patients. Patients were measured on three different days before and after an hour session including no treatment (control), water humidification (control), and 3-percent lavender aromatherapy. The Visual Analogue Scale (VAS) was used to measure the levels of anxiety and depression. They found a significant reduction in anxiety and depression after both the water humidification and the lavender aromatherapy. Following the control session, slight improvement was observed in depression levels; however, anxiety levels remained unchanged. As a result, this study demonstrated that lavender was more effective on depression than on anxiety (40). Contrary to our results, Kanaani *et al.* observed lavender aromatherapy to be effective on anxiety in haemodialysis patients. Patients inhaled 100% lavender essential oil poured on their collar for 15-20 minutes. The level of anxiety was measured using Spielberger's anxiety inventory. Kanaani et al.s' study showed a significant difference between the experimental and control groups in anxiety levels after the intervention, indicating lavender's effectiveness for anxiety in haemodialysis patients (26). Kanaani *et al.* used condensed lavender essential oil for their study subjects, which might have caused the disparity of results with the present study. Furthermore, Kanaani et al.*s'* study has not specified the inhalation of lavender had occurred in which part of dialysis sessions. In the present study, haemodialysis patients inhaled lavender essential oil in the first hour of dialysis sessions. Since haemodialysis can affect the therapeutic concentration of the essential oil, it might explain inconsistent results between the present study and the one conducted by Kanaani et al. In a quasi-experimental study with a non-equivalent control group, pre- and post-test, Kim *et al.* investigated the effects of aromatherapy on pain, depression and life satisfaction of arthritis patients using essential oils of lavender, marjoram, eucalyptus, rosemary and peppermint blended in proportions of 2:1:2:1:1. The essential oils were diluted to 1.5% after blending. Kim et al. found a significant difference between the experimental and control groups in their depression score after the intervention (41). In fact, diluted lavender essential oil reduced depression in arthritis patients. In the present study, diluted lavender essential oil had no effects on haemodialysis patients' anxiety, but it reduced the severity of depression. This result might be because even a small amount of lavender essential oil may be beneficial in depression, but a significant

reduction in anxiety appears to require higher concentrations of lavender essential oil.

Many different elements can affect levels of anxiety and depression in haemodialysis patients, including marital, sexual and financial problems and lack of social support. The study's primary limitation is the inability to eliminate or control these confounding factors. Meanwhile, our participants may have had taken medications for the treatment of anxiety and/or depression d isorders, which may hinder the interpretation of the results. We could not match patients for current medication use for anxiety and/or depression, and all patients who met the eligibility criteria were recruited in this study, irrespective of their score levels of anxiety and depression.

Conclusion

Our findings point to the need for various concentrations of lavender essential oil in order to relieve anxiety and depression. In sum, future studies are required to investigate different concentrations of lavender essential oil at different times during haemodialysis sessions (the last 20 minutes or half way through the dialysis session) to obtain specific doses for lavender essential oil to be used on haemodialysis patients suffering from anxiety and/or depression.

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This study has been approved by the Traditional and Complementary Medicine Research Center at Mazandaran University of Medical Sciences (approval number: 898/1392), registered under IRCT201407077494N9 at the Iranian Registry of Clinical Trials.

Conflict of interest

The authors have no conflict of interest to declare.

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