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The effects of aromatherapy with lavender essential oil on fatigue levels in haemodialysis patients: A randomized clinical trial

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ABSTRACT

Objective: This study was intended to examine the efficacy of lavender essential oil for the alleviation of fatigue in haemodialysis patients.
Methods and materials: This randomized clinical trial was conducted on 59 haemodialysis patients in two groups. The routine care group received the routine care, but the experimental group inhaled lavender essence 5% for 10 min, three times a week for 4 consecutive weeks. The Fatigue Severity Scale was used to assess fatigue before the intervention and after the last intervention in the second and fourth weeks.
Results: No statistically significant differences were observed between the two groups in terms of the fatigue scores before, and after the last intervention in the second and fourth weeks.
Conclusion: Our result does not support other studies suggesting that lavender essential oil is effective on fatigue in haemodialysis patients. This conflicting result can mostly be ascribed to a variety of factors such as duration of aromatherapy and differences in concentrations of lavender essential oil.

1. Introduction

The number of patients with end stage renal failure is on the rise [1]. These patients suffer from many other medical conditions and different problems. Fatigue is one of the most common side effects in haemodialysis patients and it adversely affects the patients' quality of life [2–5]. Most haemodialysis patients suffer from high scores of fatigue [4]. According to a research study by Gordon et al., one third of the patients reported that they feel worse in the first hour of haemodialysis. Furthermore, one quarter of the patients reported suffering from severe or very severe fatigue after haemodialysis [6]. In haemodialysis patients fatigue is thought to be caused by a combination of factors such as poor nutritional status [5], ageing, length of dialysis treatment [4] and reduced motivation [2]. It has been shown that fatigue is associated with symptoms such as sleep disturbances, depression, poor physical and health status in patients with renal failure requiring maintenance haemodialysis treatment [7]. A review of literature revealed several treatment options that can help relieve the symptoms of dialysis-related fatigue, including oral vitamin C [8] and non-pharmacological methods such as back massage [9], exercise training [10] and yoga-based exercise [11]. A randomized controlled trial conducted on 106 participants examined the effectiveness of acupressure on fatigue in patients with end-stage renal-disease. Fatigue was measured using the revised Piper Fatigue Scale (PFS) and the Visual Analogue Scale for Fatigue (VAS-F). The study revealed the experimental group to have experienced less fatigue after the intervention compared to the control group [12].

Essential oil aromatherapy is another way to help alleviate fatigue. Essential oils are often extracted by steam distillation from aromatic plants [13]. Lavandula is a genus of over 30 species of flowering plants, including *Lavandula angustifolia*, *Lavandula latifolia* and *Lavandula x intermedia* [14]. Lavender essential oil originates from an herb and is used in various forms, including aromatherapy oil, gel, cream, lotion, infusion, and soap. In a randomized, double-blind, placebo controlled trial, patients were orally given 80 mg/day a preparation from Lavandula species or placebo for the treatment of subsyndromal anxiety disorder.

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Results showed the efficacy and safety of lavandula oil preparation for the relief of anxiety disorder [15]. Lavender can also be used as a cream. A study showed that a 3% cream of lavender, marjoram, black pepper and peppermint essential oils reduced neck pain [16]. In addition, lavender is used as an analgesic in traditional medicine, for massage therapy [17] and for inhalation therapy [18].

Research has confirmed that lavender produces sedative effects, promotes deep sleep [19], improves sleep quality [20], provides relaxing effects [21] and relives anxiety [22], which may offer relief from fatigue. Several studies have examined the fatigue-reducing effect of inhaling lavender essential oil. Kohara et al. (2004) found that combined modality treatment including aromatherapy, foot-soak and reflexology can relieve fatigue in terminally ill cancer patients [23]. Furthermore, Lee (2000) examined the psychoneuroimmunology effect of aromatherapy massage and explored a significant decrease in fatigue scores following aromatherapy massage with 2% jojova oil mixed with lavender and rosemary oil for 20 min [24]. It has been also reported that lavender and eucalyptus inhalation can reduce fatigue in postpartum mothers [25].

As essential oils are fast-acting when inhaled and since patients are more receptive to trying natural therapies than traditional allopathic therapies, the present study was designed to help reduce fatigue in haemodialysis patients. To the best of our knowledge, no published study has explored the effects of lavender essential oil on fatigue in haemodialysis patients, so this study was intended to examine the efficacy of lavender essential oil for the alleviation of fatigue in haemodialysis patients.

2. Materials and methods

2.1. Sample and sampling method

This randomized clinical trial was conducted in two hospitals affiliated to the Mazandaran University of Medical Sciences, Sari, Iran. Haemodialysis patients who met the following inclusion criteria were sampled: be willing to participate in the study, be treated with dialysis three times a week, be undergoing dialysis for at least six months [26], be of 18 years old and over, be conscious, have the ability to verbally communicate, and have an uncompromised sense of smell [27]. The exclusion criteria include patients with a history of allergies and respiratory diseases [27], kidney transplant candidates, pregnant women, and drug addicts. The sample size was calculated as 28 patients for each group according to the mean and standard deviation of fatigue, measured using the Fatigue Severity Scale, before the intervention (48.33 ± 15.90) and four weeks after the intervention (34.25 ± 14.79), found in a study conducted by Hadian and Asgharpour [28] and 95% confidence coefficient. With consideration of the likelihood of patient exclusion during the study, the final sample consisted of 30 patients in each group. The sample was randomly allocated in two groups using the Excel RANDBETWEEN function.

2.2. Measurement instruments

There are several scales for the measurement of fatigue, such as the Fatigue Questionnaire (with 11 items for assessing the severity of fatigue in general practice settings), the Multidimensional Assessment of Fatigue (MAF) Scale (with 16 items for measuring self-reported fatigue in adults with rheumatoid arthritis), and the Modified Fatigue Impact Scale (MFIS; with 21 items for measuring fatigue in multiple sclerosis patients) [30,31]. Used in the current study, the Fatigue Severity Scale (FSS) is a general scale for measuring fatigue severity in a variety of medical and neurologic disorders [30]. A study comparing different fatigue measurement scales showed the FSS to be the most frequently used fatigue questionnaire in research studies [32]. The FSS includes nine items developed to measure the severity of fatigue symptoms experienced during the past week. Five items measure the quality of fatigue (items 1,2,3,4,6), 3 items measure physical and mental fatigue and the effect of fatigue on a person's social life (items 5,7,9), and one item (item 8) compares the severity of fatigue symptoms with each other. Each item is scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A total score of 36 or more indicates severe fatigue, and higher scores suggest more severe fatigue [27]. Azimian et al. assessed internal consistency reliability and test–retest reliability of the Persian version of the scale using interclass correlation coefficient and Cronbach's alpha, respectively. The internal consistency reliability was reported 0.96, and test–retest reliability for the FSS total score was found to be 0.93. To evaluate the convergent validity of the scale, the correlation between FSS total score and VAS-fatigue score was analysed and indicated a high correlation ($r = 0.69$, $p < 0.0001$) [33].

Demographic and medical data, including age, sex, length of haemodialysis treatment and underlying diseases, was collected using a questionnaire.

2.3. Ethical considerations

This study was approved by the Medical Research and Ethical Committee of Mazandaran University of Medical Sciences. The study was also registered in the Iranian Registry of Clinical Trials (www.irct.ir) with the registration number: IRCT201407077494N9. Each participant was verbally provided with information regarding the study and the contents of the information sheet. All participants signed a consent form in which the study procedures were explained.

2.4. Procedure

In our previous study, lavender essential oil with a concentration of 10% was inhaled for 5 min by patients on haemodialysis for needle insertion-related pain during 3 haemodialysis sessions [34]. We halved the concentration of the essential oil and doubled the exposure time in the current study. In other words, the experimental group inhaled lavender essence at a concentration of 5% for 10 min, three times a week (during dialysis sessions) for 4 consecutive weeks, while the other group received routine care. Whilst patients were in a semi-sitting position, a cotton ball soaked in 3 drops of lavender essential oil 5% (diluted 1:20 with sweet almond oil) was attached to each patient's collar and they were then asked to breathe slowly for 10 min. The essential oil was made with *L. angustifolia* and was produced by the Barij Essence Pharmaceutical Company (Kashan, Iran). Fatigue was measured using the Fatigue Severity Scale [29] in both groups for a total of three times (before the intervention, and after the last intervention in the second and fourth weeks) by only one researcher who was blind to the treatment allocation.

2.5. Data analysis

Data was analysed with SPSS (Statistical Package for Social Science, version20) using descriptive statistics (mean, standard deviation and percentage), and analytical tests (Chi-square, independent t-test, repeated measurement test, Bonferroni test and Kolmogorov–Smirnov test).

3. Results

Only one patient from the experimental group was excluded because of an infection, resulting in 29 patients in the experimental