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Investigating the Impact of Foot Reflexology on Severity of Fatigue in Patients Undergoing Hemodialysis: A Clinical Trial Study

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Abstract

Background: Fatigue is a debilitating complication in hemodialysis patients. Foot reflexology is one of the complementary medicine techniques with low complications that can control fatigue.
Objectives: The aim of this study was to determine the effect of foot reflexology massage on fatigue severity in hemodialysis patients.
Methods: In this clinical trial, 90 patients undergoing hemodialysis at Ali ibn Abi Talib hospital in Zahedan, Iran, in 2017 were randomly selected and then divided into two groups of intervention and control (n = 45 per group). The data collection tools included a demographic checklist and the fatigue severity scale developed by Krupp et al. Foot reflexology massage was performed in the intervention group for half an hour (15 minutes for each foot) by a trained researcher for three consecutive dialysis sessions. After completion of dialysis sessions, a questionnaire was completed as post-test in both groups. For data analysis, independent t-test, paired t-test, and chi-square test were run in SPSS, version 21.
Results: There was no significant difference in the mean fatigue scores between the control and intervention groups before foot reflexology massage in the three sessions of dialysis. After the intervention, the independent t-test showed a significant difference in the mean fatigue score between the control and intervention groups ($P < 0.001$).
Conclusions: The findings of this study showed that foot reflexology massage is an uncomplicated technique for reducing fatigue severity in patients undergoing hemodialysis.

Keywords: Foot Reflexology Massage, Fatigue, Hemodialysis

1. Background

Today, one of the most important issues in front of the community and healthcare providers is the increasing prevalence of chronic diseases. One of the most common chronic diseases causing significant stress in patients is chronic kidney disease (CKD) (1). The prevalence of this disease in developing countries is on a growing trend similar to other countries of the world (2). Hemodialysis is still the most common treatment for these patients worldwide that includes 70% of end-stage renal disease (ESRD) patients. By 2014, the number of dialysis patients was estimated at 2.662 million. Of these, approximately 89% were treated by hemodialysis. Considering the 5 to 6% growth of hemodialysis patients that is consistent with the global growth of ESRD patients, this treatment is expected to remain the most important treatment for ESRD patients (3). The number of dialysis patients by 2014 in Iran was determined as 27,457. Of these, 25,934 (94%) people underwent hemodialysis. Given the average growth rate of about 6% in ESRD patients in Iran, this method is still expected to remain the most important dialysis method in treating ESRD patients in Iran (3).

The recent improvements in dialysis techniques have led to a longer life expectancy in patients with CKD. However, chronic dialysis can cause complications the control of which can improve the quality of life (4). One of the most common complications of dialysis is fatigue (5), which is one of the most common nursing diagnoses in CKD patients (6). Despite the advances in treatment, fatigue is still one of the major complications in patients. The American nurses association has approved fatigue as a nursing diagnosis. According to the definition provided by this association, fatigue is a self-diagnosed condition in which a person experiences a persistent general feeling of reduced ca-

pacity for physical and mental functioning (7).

The presence of this mental and non-specific symptom in hemodialysis patients can adversely affect their self-confidence, disrupt their family, social, and mental functions, and impair their daily routine and quality of life (8). In national and international studies, fatigue has been reported in more than half of hemodialysis patients (6, 9, 10). For fatigue, hemodialysis patients are now recommended using vitamin C supplement (6), acupressure (11), and back massage (12). In recent years, non-pharmacological methods have attracted the attention of patients and caregivers to control the complications of diseases, which are known as supplementary treatments or complementary medicine. Massage is an old therapeutic technique used to cure diseases in many ancient civilizations. Massage therapy is today one of the most extensive forms of complementary therapy in the United States (13, 14).

One of the branches of complementary medicine is foot reflexology, which involves pressure and massage on reflex points on the foot. They reflect all organs of the body just like a small mirror. The mechanism of reflexology massage remains nebulous, but some theories on the mechanism of the effect of reflective massage include gate control theory of pain, nerve impulse theory, increased endorphin and enkephalin secretion thereby controlling pain, improving the lymph flow and boosting the immune system, improving nerve conduction and blood circulation, and removing toxins from the body as a result of improved blood flow (15). The results of various studies indicate the beneficial and positive effects of foot reflexology massage on relieving fatigue, increasing the quality of sleep, and reducing pain (16). Although reflexology cannot be used as an alternative treatment, it can be considered as an adjuvant therapy and a pleasant and relaxing experience (17).

Overall, due to the high prevalence of CKD and a marked increase in hemodialysis patients, and on the other hand, the need of these patients for physical and mental care, nursing care is very important to these patients, and controlling the complications of dialysis can increase their quality of life. Since reflexology massage is simple and non-invasive, it can be considered as part of nursing care. Therefore, we sought to determine the effect of foot reflexology massage on fatigue severity in patients undergoing hemodialysis.

2. Methods

This was a single-blind clinical trial with a pretest-posttest design. The study population included all patients undergoing hemodialysis presenting to Ali ibn Abi Talib hospital in Zahedan, Iran, in 2017. The inclusion criteria were having at least 18 years of age, having a history of at least 6 months of hemodialysis, being on the weekly dialysis list, undergoing three to four hour sessions of dialysis each week, being able to communicate both verbally and in written form, not having any physical conditions hampering the intervention, not having any underlying conditions with severe fatigue as a symptom, and not being diagnosed with multiple sclerosis or other central and peripheral nervous system disorders in which the patient suffers from neuromuscular impairments. The exclusion criteria comprised receiving blood products and drugs such as calcitriol and venoflex during the intervention.

The sample size was estimated to be 42.45 persons in each group, using the formula for determining the sample size, taking into account 95% confidence, the test power of 90%, and based on the values obtained in the study by Shaer Moghadam et al. (18). Due to the probability of sample attrition, 45 patients were assigned to each group, and thus 90 patients were enrolled in total.

Initially, the convenience sampling method was used. The subjects were selected randomly from the eligible patients presenting to Ali ibn Abi Talib hospital. Then, they were randomly assigned to two groups of intervention and control, such that by flipping a coin, the first person was assigned to a group, and the rest of the participants were alternately assigned to one of the groups.

After obtaining the code of ethics (IR.ZAUMS.REC.1396155) from the ethics committee of Zahedan University of Medical Sciences, the researcher presented to Ali ibn Abi Talib hospital of Zahedan, and after explaining the study procedure and obtaining informed consent from both groups, the fatigue scale was completed through interviews at the beginning, during, and at most half an hour after the onset of dialysis (as pre-test). The questionnaire was devised by Krupp et al. (1989) to examine fatigue in hemodialysis patients. This scale contains nine items rated using a 7-point Likert scale (totally agree to totally disagree). The minimum and maximum scores were 9 and 63, respectively, with higher scores indicating a higher level of fatigue. This questionnaire has been translated and validated in Iran (Cronbach's alpha: 0.96) (19). The person completing the questionnaire was not a reflective massage practitioner and was blinded to study groups.

In the intervention group, the researcher massaged both feet of each patient (each foot for 15 minutes) for half an hour, in total, using a reflective massage. In this method, the patient lied in the supine position with 30° head bed elevation and the ambient noise was minimized. The hands of the researcher were warmed before the intervention and any metal items such as ring were removed. The patient's foot was completely in the hands of the researcher. The researcher sat on a chair that was parallel to

the patient's feet. Then, under the patient's toes in the area of the kidneys (in areas 2 and 3 in the midline of the foot), massage was performed for 15 minutes for each foot. The massage was initiated with the right foot, and the overall process lasted for 30 minutes. This intervention was performed once a session for three consecutive dialysis sessions. The massage was given by a trained practitioner using thumbs in the form of sliding and gliding movements and pressure, such that resistance and stiffness were felt under the thumb. The pressure was exerted on the solar plexus point of the foot at the point that affected the kidneys. This method was adopted from valid sources (15).

At the end of the dialysis sessions, the fatigue questionnaire was completed at post-test. The massage was performed for three consecutive sessions in the intervention group. In the control group, fatigue was evaluated at the beginning and at the end of dialysis using the instrument.

The data were coded and analyzed using SPSS version 21. First, frequency, percentage, mean, standard deviation, minimum, and maximum were determined by descriptive statistics. Then, for comparison of pre- and post-intervention means in each group, paired t-test, and for comparing the means of the intervention and control groups, independent t-test was run. Comparison of the frequency of qualitative variables in the two groups was made by using the chi-square test, and to determine the effect of reflective massage, independent t-test and paired t-test were performed. The significance level was set at 0.05.

3. Results

Overall, 88 patients took part in the study. The mean age of the subjects in the intervention and control groups was 47.91 $\pm$ 14.02 and 50.09 $\pm$ 16.35 years, respectively. Other characteristics of the individuals are presented in Table 1. The intervention and control groups were homogeneous in terms of demographic, clinical, and hemodialysis characteristics (e.g., duration of sessions, pump rounds, and filter), and there was no significant difference between them (Table 1). In the intervention group, the mean post-test fatigue score was significantly lower than the mean in the pre-test in all the three sessions, but in the control group, the difference between the pre-test and post-test scores was not significant (Table 2).

In addition, we found that on the first day, the mean fatigue score in the intervention group decreased before and after the intervention; it also decreased in the control group. However, the mean fatigue score in the intervention group was lower than that in the control group after the intervention, but independent t-test showed that the mean fatigue score in the intervention and control groups did not differ significantly (P = 0.14). Nevertheless, on the second and third sessions, independent t-test reflected a significant difference between the two groups (P < 0.0001; Table 2).

4. Discussion

Nowadays, patients and caregivers prefer non-pharmacological methods to control the symptoms and complications of chronic diseases (1). Foot massage has been considered as a safe and inexpensive method in various studies. The results of the current study showed that foot reflexology massage could significantly diminish fatigue in hemodialysis patients, which is a common complication in these patients. Considering that the only fundamental change in lifestyle of these individuals during the three consecutive sessions of dialysis was the implementation of foot reflexology massage during dialysis at the hospital, it can be claimed that reflective massage has been effective in reducing fatigue in these individuals. The findings of various studies corroborate this result.

The results of a study performed among hemodialysis patients in Turkey (2013) indicated the effectiveness of reflective massage in patients with muscle cramps (20). Another study in Iran showed the positive impact of hand massage on hemodialysis patients' fatigue (18). In addition, the results of other studies have shown the effectiveness of foot reflexology massage in reducing anxiety and pain after gastrointestinal surgery (in patients with gastrointestinal cancers) (21) and coronary artery bypass graft surgery (22). They suggested foot reflexology massage as a safe and inexpensive method.

One of the advantages of the current study compared to other similar studies was its larger sample size. In addition, in some former studies, the amount of pressure applied during the massage and other details of the intervention were not reported (19, 23). In this study, the length of the massage and the amount of pressure applied were tried to be according to the existing standards.

4.1. Conclusion

In sum, it can be concluded that in most studies, fatigue has been significantly reduced. Considering the experiences of researchers during the study and observing the interest and eagerness of nurses to learn the reflexology technique, it seems that such complementary medicine interventions as non-pharmacological methods can be applied along with other conventional treatments and care. Finally, future studies are recommended to compare reflexology with drug therapy in reducing fatigue in hemodialysis patients.

Table 1. Comparison of Some Demographic and Clinical Characteristics Between the Intervention and Control Groups

Variable	Intervention Group[a]	Control Group[a]	P Value
Gender			0.06[b]
Female	15 (33.3)	23 (53.5)	
Male	30 (66.7)	20 (46.5)	
Dialysis filter			0.45[b]
Low flux	28 (62.2)	30 (69.8)	
High flux	17 (37.8)	13 (30.2)	
Underlying disease			0.32[b]
Diabetes	10 (22.2)	4 (9.3)	
Hypertension	12 (26.7)	14 (32.6)	
Diabetes and hypertension	10 (22.2)	8 (18.6)	
Other diseases (polycystic kidney, kidney stone, pyelonephritis, etc.)	13 (28.9)	17 (39.5)	
Occupation			0.34[b]
Unemployed	11 (24.4)	8 (18.6)	
Housewife	12 (26.7)	18 (41.9)	
Other occupations	14 (31.1)	8 (18.6)	
Employed	8 (17.8)	9 (20.9)	
Marital status			0.90[b]
Single	11 (24.4)	11 (25.6)	
Married	34 (75.6)	32 (74.4)	
Education			0.51[b]
Illiterate	15 (33.3)	19 (44.2)	
Elementary	15 (33.3)	10 (23.3)	
Diploma	11 (24.4)	8 (18.6)	
Higher than diploma	4 (8.9)	6 (14)	
Age, years	47.91 ± 14.02	50.09 ± 16.35	0.50[c]
Dialysis duration (mo)	46.46 ± 42.33	35.97 ± 28.81	0.18[c]
Dialysis pump speed (mm/min)	261.44 ± 44.76	268.83 ± 30.35	0.36[c]

[a]Values are presented as No. (%) or mean ± SD.
[b]Chi-Square Test.
[c]Independent t-test.

Table 2. Comparison of the Mean Score of Fatigue in Dialysis Patients' Pre- and Post-Foot Reflexology Massage in the Intervention and Control Groups in Three Hemodialysis Sessions

Group	Pre-Intervention[a]	Post-Intervention[a]	P Value[b]
First session			
Control	11.65 ± 51.65	51.35 ± 11.60	0.37
Intervention	54.67 ± 11.82	47.58 ± 12.5	< 0.001
P value[c]	0.23	0.14	
Second session			
Control	51.60 ± 10.81	51.53 ± 11.53	0.78
Intervention	52.02 ± 11.27	45.58 ± 11.95	< 0.0001
P value[c]	0.86	0.01	
Third session			
Control	52.09 ± 11.34	51.58 ± 11.64	0.12
Intervention	50.07 ± 11.15	43.73 ± 12.18	< 0.001
P value[c]	0.40	< 0. 001	

[a]Values are presented as mean ± SD.
[b]Paired t-test.
[c]Independent t-test.

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