

# The effects of two methods of reflexology and stretching exercises on the severity of restless leg syndrome among hemodialysis patients

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## ABSTRACT

**Background:** Restless leg syndrome prevalence is high among the patients undergoing hemodialysis. Due to several side effects of medicational treatments, the patients prefer non-medicational methods. Therefore, the present study aimed to investigate the effects of two methods of reflexology and stretching exercises on the severity of restless leg syndrome among patients undergoing hemodialysis.

**Materials and Methods:** This study is a randomized clinical trial that was done on 90 qualified patients undergoing hemodialysis in selected hospitals of Isfahan, who were diagnosed with restless leg syndrome through standard restless leg syndrome questionnaire. They were randomly assigned by random number table to three groups: Reflexology, stretching exercises, and control groups through random allocation. Foot reflexology and stretching exercises were conducted three times a week for 30–40 min within straight 4 weeks. Data analysis was performed by SPSS version 18 using descriptive and inferential statistical analyses [one-way analysis of variance (ANOVA), paired *t*-test, and least significant difference (LSD) *post hoc* test].

**Results:** There was a significant difference in the mean scores of restless leg syndrome severity between reflexology and stretching exercises groups, compared to control ( $P < 0.001$ ), but there was no significant difference between the two study groups ( $P < 0.001$ ). Changes in the mean score of restless leg syndrome severity were significantly higher in reflexology and stretching exercises groups compared to the control group ( $P < 0.001$ ), but it showed no significant difference between reflexology massage and stretching exercises groups.

**Conclusions:** Our obtained results showed that reflexology and stretching exercises can reduce the severity of restless leg syndrome. These two methods of treatment are recommended to the patients.

**Key words:** Hemodialysis, Iran, massage, muscle stretching exercises, patients undergoing hemodialysis, reflexology massage, restless leg syndrome, stretching exercises

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## INTRODUCTION

Patients with final stage of renal diseases need replacing treatments to survive. Hemodialysis is one of the most prevalent treatments for these patients estimated as over 1 million worldwide.<sup>[1]</sup> In Iran, this estimate was about 11,250 patients in 2003, 18,000 in 2007,<sup>[2,3]</sup> and 20,000 in 2012.<sup>[4]</sup> The patients undergoing hemodialysis usually have several complications which result from either the end stage of renal failure or the type of treatment.

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One of these complications is restless leg syndrome<sup>[3]</sup> that is accompanied with sensory signs and motion disorders of limbs, especially legs.<sup>[5]</sup> The signs of this syndrome are observed during rest or lack of activity and are reduced by moving the involved limb. Although this syndrome signs are present during the day and night, they get worse at night,<sup>[6]</sup> and it leads to patients' sleep disorder and influences their function, especially in the evening and at night. It, consequently, impairs their quality of life.

Research showed a higher mortality among these patients.<sup>[7]</sup> This syndrome is more prevalent in chronic renal failure patients compared to normal population<sup>[8]</sup> in such a way that primary estimation of its prevalence among hemodialysis patients showed it to be 20–80%.<sup>[9]</sup> The associated pathophysiology of restless leg syndrome is yet unknown, but as the syndrome is relieved by low dosage of levodopa consumption, dopaminergic system is considered to play the main role in causing such a syndrome.<sup>[10,11]</sup> As medications have their own specific side effects, patients are always after non-medication methods<sup>[12]</sup> including complementary medicine, of which reflexology can be named. Reflexology is a sort of pressure, which is often given on the feet. Feet are the most sensitive and the best part of body to administer reflexology.<sup>[13]</sup> Experts of reflexology believe that feet can be divided into several reflex points which are associated with and connected to all body organs and parts.<sup>[14]</sup> The main mechanism of this treatment is through its effect on nervous system in such a way that the pressure to a specific part of skin stimulates nervous reflexes and their transmission to brain. On the other hand, reflexology provokes the chemical system of the nerves, balances the enzymes, and regulates endocrine function.<sup>[15]</sup> There are other beneficial non-medication methods to reduce the severity of restless leg syndrome. One of these methods is minor to moderate activity of the limbs.<sup>[16]</sup>

Research showed that movement-based therapy methods have a positive effect on controlling some of the syndrome signs, and the patients' daily function can be improved through physical activity strategies.<sup>[17]</sup> Movement therapy is among the effective strategies to improve motor function, prevent the complications, and lower the disabilities resulting from restless leg syndrome. Among the movement therapy methods, stretching exercises are one of the oldest treatment methods,<sup>[18]</sup> which improve muscles' circulation and facilitate provision of nutrients to the cells. As poor circulation enhances manifestation of restless leg syndrome signs<sup>[19]</sup> and activity modifies this condition, stretching exercises may be effective in reduction of this syndrome severity. Based on the obtained results, majority of the activities of hemodialysis nurses are carried out in the absence of the physicians, such that their role in treatment

of the patients has been estimated as 80%.<sup>[20]</sup> Nephrology nurses should be able to control the complications resulting from the disease, and administer renal replacement treatment and proper non-medication interventions for the patients.<sup>[21]</sup> Restless leg syndrome highly influences the physical and psychological aspects of hemodialysis patients and impairs their trend of life.<sup>[22]</sup> On the other hand, the number of consumed medications is very high among these patients, and most of these medications are excreted through kidneys; therefore, adding another medication to treatment can add up to patients' problems, and thus, non-medication methods seem essential for these patients. As research showed the effect of reflexology complementary medicine and stretching exercise on the level of dopamine,<sup>[23,24]</sup> the researchers decided to investigate the effect of two methods of reflexology massage and stretching exercises on the severity of restless leg syndrome among patients undergoing hemodialysis.

## MATERIALS AND METHODS

This is a three-group, two-stage (before, after) clinical trial (NIRCT no. 2014040717159). Study population comprised all chronic end-stage renal failure patients who referred to selected hospitals in Isfahan three times a week and underwent hemodialysis for 4 h in each session.

Inclusion criteria were patients aged 18–65 years<sup>[25]</sup> whose hemodialysis had started for at least 3 months prior to the study. They were hemodialyzed three times a week with bicarbonate solution.<sup>[26]</sup> Those who had no idiopathic restless leg syndrome, not consuming medications to manage restless leg syndrome signs or medications worsening these signs (three-cycle antidepressants, serotonin selective reuptake inhibitors, anti-nausea medications, antiepileptics, antipsychotics, dopamine antagonists),<sup>[10]</sup> no infection, wound, and a serious complication in feet, and peripheral neuropathy or vascular problems in lower limbs were selected. Whenever the subjects lost interest to remain in the study or any change occurred in the inclusion criteria at any stage, the subjects were excluded. In the first stage, after obtaining an informed written consent, all hemodialysis patients completed restless leg syndrome standard questionnaire. The clients who responded positive to all four questions of restless leg syndrome diagnostic questionnaire were considered as the clients with restless leg syndrome. Next, through random numbers table, 90 subjects meeting the inclusion criteria were selected, and the goal of the study was explained to them by the researcher in their first meeting. Demographic information form was completed through referring to patients' medical files and questioning the clients. The subjects were notified that they could ask their questions and ambiguous points

through telephone calls and receive the answers. In the second stage, the subjects were assigned to three groups through random allocation and use of sealed and plumed envelopes. Sample size of at least 30 subjects in each group was considered. There were three envelopes containing the words “reflexology,” “stretching exercises,” and “control.”

Each patient randomly selected one of the envelopes and was assigned to the group mentioned in the envelope.

Then, through restless leg syndrome severity standard questionnaire, the score of restless leg syndrome was calculated for each patient separately and the total mean of each group was calculated. Next, interventions of reflexology and stretching exercise were administered for two groups as three sessions a week (12 sessions), each session lasting for 30–40 min in the first 2 h of dialysis session in which there were no notable changes in BP respectively. Control group received routine interventions. All subjects completed the research.

Data collection tools were two questionnaires. The first questionnaire contained restless leg syndrome patients’ detection form. The second questionnaire was restless leg syndrome severity standard measurement questionnaire in which the patients with scores less than 10 were categorized in minor; 11–20 as moderate; 21–30 as severe, and 31 or over as being in a very severe stage of the syndrome.<sup>[27]</sup> Restless leg syndrome severity questionnaires were completed by the researcher before and immediately after the interventions. Validity and reliability of both questionnaires in Iran were confirmed by Habibzade *et al.* in 2011.<sup>[28]</sup> Content validity and Cronbach alpha were used to confirm the validity and reliability of the data collection tools. Cronbach alphas were calculated to be 0.97 and 0.94 for restless leg syndrome diagnosis and restless leg syndrome severity investigation questionnaires, respectively. Data were analyzed by paired *t*-test one-way analysis of variance (ANOVA) and least significant difference (LSD) *post hoc* test, and the significance level was considered as  $P < 0.05$ .

### Ethical considerations

This research was approved by the ethics committee of Isfahan University of Medical Sciences.

### RESULTS

Findings of the present study showed that the subjects’ mean (SD) age was 55.45 (12.08) years, mean length of hemodialysis was 35.34 (29.01) months, and 50% of the subjects were women. Statistical tests showed that frequency distribution of sex, mean age, and length

of hemodialysis (months) were identical in the three groups and showed no significant difference. Paired *t*-test showed a significant difference in the mean scores of restless leg syndrome severity before and immediately after intervention in reflexology and stretching exercises groups, respectively ( $P < 0.001$ ), but showed no significant difference in the control group. One-way ANOVA showed no significant difference in the mean score of restless leg syndrome severity in the three groups before intervention, but the difference was significant immediately after intervention ( $P < 0.05$ ) [Table 1]. Mean score change of restless leg syndrome in three groups of reflexology, stretching exercises, and control immediately after intervention showed that the changes were significantly more in the two study groups compared to control ( $P < 0.05$ ) in such a way that both interventions reduced the severity of restless leg syndrome signs more, compared to the control group [Table 2].

LSD *post hoc* test showed a significant difference in the mean scores of restless leg syndrome severity immediately after intervention in reflexology and control and in stretching exercises and control groups ( $P < 0.05$ ) [Table 3], but there was no significant difference in the mean scores of restless leg syndrome severity immediately after intervention in reflexology and stretching exercises.

### DISCUSSION

Comparison of the effects of reflexology and stretching exercises methods showed that both methods were effective, and there was no significant difference. The severity of restless leg syndrome signs was significantly reduced after reflexology therapy, compared to before intervention. Ozdemir *et al.* stated that reflexology therapy reduced the severity of fatigue, pain, and muscular cramps of hemodialysis patients.<sup>[29]</sup> Wang *et al.* showed that reflexology reduced muscular cramps during the interval between two sessions of hemodialysis.<sup>[30]</sup> Dalal *et al.* (2011) reported that reflexology therapy reduced

**Table 1: Comparison of restless leg syndrome mean scores in reflexology, stretching exercises, and control groups before and immediately after intervention**

Group Time	Reflexology		Stretching exercises		Control		One-way ANOVA
	Mean	SD	Mean	SD	Mean	SD	
Before intervention	27	6/2	26.9	7.9	26.8	6.3	$F=0.007$ $P=0.99$
Immediately after intervention	12.5	6.3	11.06	4.48	28.43	5.98	$F=4.28$ $P<0.001$
Paired <i>t</i> -test	$t=11.69$ $P<0.001$		$t=11.71$ $P<0.001$		$t=1.09$ $P=0.316$		

SD: Standard deviation, ANOVA: Analysis of variance

**Table 2: Restless leg syndrome mean score changes in reflexology, stretching exercises, and control groups immediately after intervention**

Group	Restless leg syndrome severity score changes	
	Mean	SD
Reflexology	-14.5	6.8
Stretching	-15.9	7.4
Control	1.6	2.2

SD: Standard deviation

**Table 3: Obtained results of paired comparison concerning severity of restless leg syndrome immediately after intervention**

Groups	P
Control vs. reflexology	<0.001
Control vs. stretching exercises	<0.001
Reflexology vs. stretching exercises	0.33

pain, controlled blood sugar, and improved nervous and temperature conductivity among diabetic nephropathy patients.<sup>[31]</sup> Rezvani *et al.* showed that reflexology reduced low back pain.<sup>[32]</sup> Lee *et al.*, in a systematic review study, showed the effect of reflexology therapy on fatigue, sleep disorders, and pain.<sup>[33]</sup> The main mechanism of treatment in reflexology is its effect on the nervous system in such a way that the pressure given on a specific part of skin stimulates nervous reflexes and transmission of impulses to the brain. It also provokes nervous chemical system and balances the enzymes and regulates endocrine function. This mechanism seems to be effective on reduction of complications of various diseases including restless leg syndrome in hemodialysis patients. Our obtained findings also showed that restless leg syndrome severity was significantly lowered after stretching exercises, compared to before intervention.

Giannaki *et al.* also showed that educating the patients with sports and administering low dosage of dopamine antagonist were effective on reduction of restless leg syndrome signs to 46% and 56%, respectively.<sup>[34]</sup> Parsons *et al.* (2006) showed that a sport program with low severity acted as an assistive treatment in improvement of physical function and efficiency of hemodialysis patients.<sup>[35]</sup> Bennett *et al.* showed that the fall risk of hemodialysis patients was reduced after a strength and balance exercises program.<sup>[36]</sup> Bennett *et al.*'s literature review study showed that sport had positive effects on reduction of cardiovascular diseases, increase in quality of life and physical function, reduction of depression and muscular disease, and reduction of mortality in patients with restless leg syndrome.<sup>[37]</sup> Smart and Steele, in 15 studies, showed the effects of sports education on preservation of fat-free body mass, quadriceps muscle, prevention of knee deformation, and increase in strength of knee and pelvis joints in hemodialysis patients.<sup>[38]</sup> Mortazavi *et al.* reported

the positive effect of aerobic sports on improvement of restless leg syndrome signs in hemodialysis patients.<sup>[39]</sup> Henrique *et al.* reported that regular aerobic exercises were effective on improvement of physical capacity and hypertension control of hemodialysis patients,<sup>[40]</sup> which is consistent with the present study. Although the mean changes of restless leg syndrome were higher in stretching exercises group compared to reflexology, they were not significant. Therefore, stretching exercises seem to be more effective on reduction of disease complications as well as some of the problems of patients, such as restless leg syndrome. As learning these exercises is easy and almost possible for all patients and needs no special equipments and costs, the disturbing complications of this syndrome can be lowered through patients' education of these exercises and supervising the patients' proper practice during hemodialysis.

In this way, the economic and psychological burden imposed on the patients and their families can be prevented. Administration of reflexology can be an efficient step toward reduction of this syndrome severity. Therefore, educating the patients and health care team concerning these two methods can be an effective action in reduction of this syndrome. The only limitation that was out of researcher's control in the present study was subjects' personal differences concerning social, cultural, psychological, and familial factors, which might have affected the evaluation and tolerance of the severity of signs in patients. In the end, the researchers suggest conducting a similar study with a bigger sample size and for a longer period of time, as well as investigating the severity of restless leg syndrome signs 2 and 6 months after intervention to declare the longevity of intervention and the mean score of restless leg syndrome signs' severity.

## CONCLUSION

Results showed that both reflexology and stretching exercises methods were effective on reduction of restless leg syndrome among the patients undergoing hemodialysis, and they are suggested in treatment of such patients.

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**Conflicts of interest**

There are no conflicts of interest.

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