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

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.[1] In Iran, this estimate was about 11,250 patients in 2003, 18,000 in 2007,[2,3] and 20,000 in 2012.[4] The patients undergoing hemodialysis usually have several complications which result from either the end stage of renal failure or the type of treatment.
As medications including complementary medicine are excreted through kidneys; therefore, adding another medication to treatment can add up to patients’ problems, and thus, non-medical methods seem essential for these patients. As research showed the effect of reflexology complementary medicine and stretching exercise on the level of dopamine, 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 whose hemodialysis had started for at least 3 months prior to the study. They were hemodialyzed three times a week with bicarbonate solution. 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), 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 administrated 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. 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. 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].

**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. Wang et al. showed that reflexology reduced muscular cramps during the interval between two sessions of hemodialysis. Dalal et al. (2011) reported that reflexology therapy reduced...

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

| Group               | Reflexology Mean | Reflexology SD | Stretching exercises Mean | Stretching exercises SD | Control Mean | Control SD | One-way ANOVA |
|---------------------|------------------|----------------|---------------------------|-------------------------|--------------|------------|---------------|
| Before intervention | 27               | 6/2            | 26.9                      | 7.9                     | 26.8         | 6.3        | \( F=0.007 \) |
| Immediately after intervention | 12.5            | 6.3            | 11.06                     | 4.48                    | 28.43        | 5.98       | \( F=4.28 \)  |
| Paired t-test       | \( \approx 11.69 \) | \( t=0.31 \)  | \( \approx 11.71 \)        | \( t=0.31 \)             | \( \approx 1.09 \) | \( t=0.001 \) | \( t=0.316 \) |

SD: Standard deviation, ANOVA: Analysis of variance
Restless leg syndrome severity score changes

| 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

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  |

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.

REFERENCES

1. Taal MW, Chertow GM, Marsden PA, Skorecki K, Yu AS, Brenner BM. Brenner and Rector's The Kidney. 9th ed. Vol. 1. Elsevier Saunders; 2012. p. 2294-6.
2. Shahdadi H, Badakhsh M, Msyanya N, Heydari M, Rahnama M. The effect of increasing blood flow rate on complications and dialysis adequacy in hemodialysis patients with low KTV. Iranian J Nurs Res 2010;5:62-7.
3. Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. Brunner and Suddarth's Textbook of Medical-Surgical Nursing. 12th ed. Philadelphia: Lippincott Williams and Wilkins; 2008. p. 1326-534.
4. Available from: http://www.salamatnews.com/viewnews.aspx?ID=37064, 1390. [Last accessed on 2012 Dec 22].
5. Montplaisir J, Allen R, Walters A. Restless legs syndrome and periodic limb movements during sleep. In: Kryger MH, Roth T, Dement WC, editors. Principles and Practice of Sleep Medicine. 4th ed. Philadelphia: Saunders; 2005. p. 839-52.
6. Allen RP, Piccietti D, Hening WA, Trenkwalder C, Walters AS, Montplaisir J. Restless Legs Syndrome Diagnosis and Epidemiology workshop at the National Institutes of Health; International Restless Legs Syndrome Study Group. Restless legs syndrome: Diagnostic criteria, special considerations, and epidemiology. A report from the restless legs syndrome diagnosis and epidemiology workshop at the National Institutes of Health. Sleep Med 2003;4:101-9.
7. Ansarin K, Shabanpour J, Argani H, Airomlou H. Restless legs syndrome in patients with chronic renal failure is not related to serum Ferritin or serum Iron levels. Chest 2005;128:383S.
8. Kavanagh D, Siddiqui S, Geddes CC. Restless legs syndrome in patients on dialysis. Nephrol Dial Transplant 2006;21:571-7.
9. Parker KP. Sleep disturbances in dialysis patients. Sleep Med Rev 2006;11:131-43.
10. Musci I, Molnar MZ, Ambrus C, Szeifert L, Kovacs AZ, Zoller R, et al. Restless legs syndrome, insomnia and quality of life in patients on maintenance dialysis. Nephrol Dial Transplant 2005;20:571-7.
11. RLS Medical Bulletin. RLS Foundation. Viewed February. 2013. Available from: http://www.RLS.org/Document.Doc? & id=70. [Last accessed on 2013 Feb 25].
12. Mckinney ES, Rowen J, Susan AW. Maternal-Child Nursing. 2nd ed. St. Louis MO: Elsevier, Saunders; 2005. p. 223-333.
13. Kozier B, Erb G, Berman A, Snyder Sh. Fundamental of Nursing: Concept, Process and Practice. 8th ed. New Jersey: Pearson Prentice Hall; 2008. p. 1200-15.
14. William F. Reflexology. 2009. Available from: http://www.crystaliks.com. [Last accessed on 2013 Feb 28].
15. Yazdanpanah Y, Mohhebi Sh. Reflexology Beryl Crane: The Definitive Practitioner’s Manual: Recommended by the International Therapy Examination Council for Students and Practitioners; 2007. p. 9-86.
16. Kim SW, Shin IS, Kim JM, Yang SJ, Shin HY, Yoon JS. Bupropion may improve restless legs syndrome: A report of three cases. Clin Neuropharmacol 2005;28:298-301.
17. Keus SH, Bloem BR, Hendriks EJ, Brederoo-Cohen AB, Munneke M; Practice Recommendations Development Group. Evidence-based analysis of physical therapy in Parkinson’s disease with recommendations for practice and research, Mov Disor 2007;22:451-60; quiz 600.
18. Ylin J. In: Mostmard J, Bahmani F, Mirshams M, editors. Stretching therapy for sport and manual therapy. Isafahan, Iran: Isafahan University of Medical Sciences; 2010. p. 1-64.
19. Home Remedies. Available from: http://www.livestrong.com/ article/18910-exercises-restless-leg-syndrome/#ixzz1uM5QEy4S, 2013. [Last accessed on 2013 Mar 19].
20. Hashemi MS, Shahgholian N. Chronic Renial Disease and Replace Renal Therapy. Publisher Heidari; 2013. p. 74-6.
21. Murigai T, Noble H, McGrowan A, Chaminne M. Dialysis access and the impact on body image: Role of the nephrology nurse. Br J Nurs 2008;17:362-6.
22. Kushida C, Martin M, Nikam P, Blaisdell B, Wallenstein G, Ferini-Strambl L, et al. Burden of restless legs syndrome on health-related quality of life. Qual Life Res 2007;16:17-24.
23. Tillerson JI, Caudle WM, Reverón ME, Miller GW. Exercise induces behavioral recovery and attenuates neurochemical deficits in rodent models of Parkinson’s disease. Neuroscience 2003;9:899-911.
24. Bayard M, Avonda T, Wadzinski J. Restless legs syndrome. Am Fam Physician 2008;78:235-40.
25. Meira FS, Poli De Figueiredo CE, Figueiredo AE. Influence of sodium profile in preventing complications during hemodialysis. Hemodial Int 2007;11(Suppl 3):S29-32.
26. Munoz Mendoza J, Sun S, Chertow GM, Moran J, Doss S, Schiller B. Dialysate sodium and sodium gradient in maintenance hemodialysis: A neglected sodium restriction approach? Nephrol Dial Transplant 2011;26:1281-7.
27. Wetter TC. Restless legs syndrome. In: Ovureen S, Reading P, editors. Sleep Disorder in Neurology. USA: Wiley-Blackwell Publisher; 2010. p. 87-99.
28. Habibzade H, Khalakk哈利, Ghaneii R. Study of the relationship between restless legs syndrome and sleep disturbance among patients in Critical Care Units. Iranian J Critical Care Nurs 2011;4:153-58.
29. Ozdemir G, Ovayolu N, Ovayolu O. The effect of reflexology applied on hemodialysis patients with fatigue, pain and cramps. Int J Nurs Pract 2013;19:265-73.
30. Wang MY, Tsay PS, Lee PH, Chang WY, Yang CM. The efficacy of reflexology: Systematic review. J Adv Nurs 2008;62:512-20.
31. Dalal K, Maran VB, Pandey RM, Tripathi M. Determination of efficacy of reflexology in managing patients with diabetic neuropathy: A randomized controlled clinical trial. Evid Based Complement Alternat Med 2014;2014:843036.
32. Rezvani AM, Nikbakht R, Pournamadar Z. The effect of foot reflexology on pain intensity and disability of patients with chronic low back pain in physiotherapy unit of bagiyatallah hospital. Med surg Nurs J 2012; 2:30-5.
33. Lee J, Han M, Chung Y, Kim J, Choi J. Effects of foot reflexology on fatigue, sleep and pain: A systematic review and meta-analysis. J Korean Acad Nurs 2011;41:821-33.
34. Giannaki CD, Sakkas GK, Karatzafiri C, Hadjigeorgiou GM, Lavdas E, Kyriakides T, et al. Effect of exercise training and dopamine agonists in patients with uremic restless legs syndrome: A six-month randomized, partially double-blind, placebo-controlled comparative study. BMC Nephrol 2013;14:194.
35. Parsons TL, Toffelmire EB, King-VanVlack CE. Exercise training during hemodialysis improves dialysis efficacy and physical performance. Arch Phys Med Rehabil 2006;87:680-7.
36. Bennett PN, Breugelmans L, Chan D, Calo M, Ockerby C. A combined strength and balance exercise program to decrease falls risk in dialysis patients: A feasibility study. J of Exercise Physiology 2012;15:26-39.

37. Bennett PN, Breugelmans L, Barnard R, Agius M, Chan D, Fraser D, et al. Sustaining a hemodialysis exercise program: A review. Semin Dial 2010;23:62-73.

38. Smart N, Steele M. Exercise training in haemodialysis patients: A systematic review and meta-analysis. Nephrology (Carlton) 2011;16:626-32.

39. Mortazavi M, Vahdatpour B, Ghasempour A, Taheri D, Shahidi S, Moeinzadeh F, et al. Aerobic exercise improves signs of restless leg syndrome in end stage renal disease patients suffering chronic hemodialysis. ScientificWorldJournal 2013;2013:628142.

40. Henrique DM, Reboredo Mde M, Chaoubah A, Paula RB. Aerobic exercise improves physical capacity in patients under chronic hemodialysis. Arq Bras Cardiol 2010;94:823-8.