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Comparing the effects of slow-stroke back massage and acupressure on pruritus in chronic kidney disease patients undergoing hemodialysis

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Abstract
Objective(s): Pruritus is one of the most important and debilitating skin complications in hemodialysis (HD) patients. Therefore, this study aimed to determine the comparative effect of slow-stroke back massage (SSBM) and acupressure on pruritus in patients undergoing HD.
Methods: In this clinical trial study, 50 patients with pruritus were randomly divided into two intervention groups. The interventions were performed three times a week for four weeks. The acupressure at SP10 and LI11 points and SSBM were performed for 10 minutes after HD. The Yosipovitch pruritus questionnaire and laboratory parameters form were used to collect data before and one week after the intervention.
Results: Acupressure and SSBM interventions caused significant changes in CRP and blood phosphorus levels, pruritus history, duration effect of antipruritic medications, sleep, quality-of-life, itch sensation and affective dimensions, daily activities, severity of pruritus, and location of pruritus. Nonetheless, the potassium levels in the serum did not show any notable alterations. Additionally, there was no noticeable distinction between groups in regard to any of the measured variables.
Conclusion: The results of our study suggest that both SSBM and acupressure could be beneficial as part of a comprehensive approach to managing pruritus in HD patients.

Keywords: Acupressure, hemodialysis, pruritus, slow stroke back massage

Introduction

Itchy skin, or pruritus, is a frequent and often overlooked issue among hemodialysis (HD) patients with chronic kidney disease (CDK) [1]. Data from past studies show that between 26% and 48% of HD patients reported moderate to severe discomfort due to pruritus [2, 3]. CKD-associated pruritus (CKD-aP) is a condition that can significantly affect a patient's quality of life, leading to sleep problems, depression, and reduced mental and physical abilities [3]. It has also been linked to an increased risk of missed dialysis sessions, hospitalization, and death, particularly from cardiovascular and infection-related causes [1, 3]. Currently, there is no definitive treatment for pruritus [4], and some studies suggest that it may persist even after a renal transplant [5]. The underlying cause of pruritus is poorly understood, limiting treatment options. Treatments are often based on personal experience or small, uncontrolled studies [6]. For patients with pruritus that do not respond to dialysis or topical treatments, systemic therapies like antihistamines and gabapentinoids have been used [6, 7]. However, these studies often have limitations due to small sample sizes and poor design.

In recent years, complementary and alternative medicine (CAM) has been explored as a potential treatment for pruritus [8]. CAM encompasses a wide range of medical systems, practices, and products that are distinct from conventional medicine [9]. Manipulative and body-based therapies, such as acupressure and massage, are among the most popular CAM methods [10, 11].

Acupressure is a type of complementary and alternative medicine (CAM) that involves applying pressure to specific points on the body's energy-carrying meridians. This can be done using fingertips, palms, beads, or special devices [12]. Acupressure is believed to improve well-being by restoring the body's energy, promoting blood circulation, and stimulating the release of neurotransmitters [13]. It is a non-invasive, simple, and cost-effective method that has been recommended for managing symptoms and problems associated with various diseases [14].

The slow stroke back massage (SSBM) technique is done by giving a slow and gentle massage on the back area lasting from 3 to 10 minutes [11]. The therapeutic effect resulting from SSBM therapy is feeling relaxed and feeling comfortable in the muscles, nerves, and vascular. SSBM can provide several positive effects on the body, including reducing blood pressure and improving blood circulation [15]. SSBM therapy has been proven to reduce systolic and diastolic blood pressure by 70.8% and 83% [16].

Considering the significant impact of pruritus in patients with CKD-aP on HD, it is crucial to conduct a study to improve their condition. This randomized controlled trial evaluated the effectiveness of SSBM and acupressure in pruritus, as measured by the Yosipovitch pruritus questionnaire (YPQ) score and certain laboratory parameters, in CKD-aP patients on HD. The results of this study could provide valuable guidance for treating pruritus in CKD-aP patients with HD.

Methods

1. Aim

This study aimed to compare the effectiveness of SSBM and acupressure in pruritus in patients with CKD-aP who are undergoing HD.

2. Setting

The study was conducted between November 2020 and March 2021 with CKD-aP patients of two university hospitals at Mashhad University of Medical Sciences (MUMS) in the Northeast of Iran.

3. Design and participants

This randomized clinical trial aimed to compare the effects of acupressure and SSBM on CKD-aP patients in one province in Iran. The sample size was calculated based on a study by Yan *et al*. that investigated the effect of auricular acupressure on uremic pruritus in HD patients [17]. Like the current study, the variables in Yan *et al*.'s study included non-pharmacological methods. They reported an average pruritus score of 3.8 ± 1.6 in the auricular acupressure group and 5.5 ± 2.2 in the control group after the procedure. Based on the data, a minimum of 22 patients in each group was necessary to statistically understand the difference between the groups with an 80% confidence level and a 5% sampling error. The current study had 27 patients in each group and a total of 54 patients to increase the effect size and account for data loss. Patients who met the inclusion criteria were assigned to two groups using the closed envelope method, where they chose an envelope with either "acupressure" or "SSBM" written on it. A total number of 5 patients were excluded from the study due to some reasons (Figure 1). The study was completed with 24 patients in the acupressure group and 25 patients in the SSBM group.

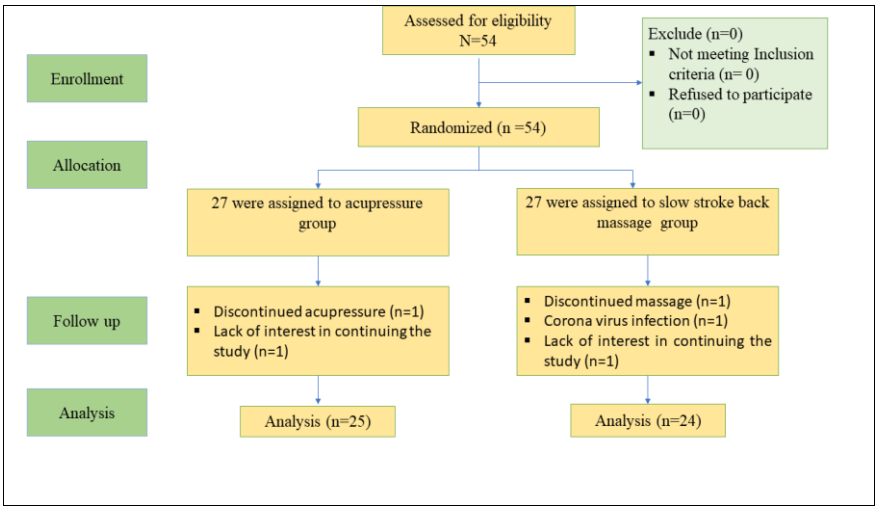

Fig 1: Consort flow diagram.

3.1 The patients had to meet the following inclusion criteria: a) Absence of open wound or infection in the intervention area; b) written consent to participate; c) over 18 years old; d) able to communicate; e) able to speak and understand Persian; f) received HD three times a week for at least six months; g) no loss of sensation, mass, fracture, or ingrown toenail; h) lower extremities free from pathological and tumoral disease, no symptoms of phlebitis, embolism, or bleeding disorder related to amputation, fracture, infection, wound, or skin disease; i) mild to severe pruritus with a score between 1 and 10 on the visual scale of pruritus at least 2 weeks before the test; j) not using traditional medicine agents to relieve pruritus 1 week before the test; k) aged between 18 and 80 years; l) HD solution temperature between 36.5 and 37.5 °C; m) no current pruritus lesions (except dry skin).

3.2 The exclusion criteria were as follows: a) Changing the HD center; b) Experiencing severe stressful events during the research period (divorce, death of dependents, etc.); c) Performing kidney transplant during the research period; d) Amputation of lower or upper limbs during the research period.

4. Interventions

Before the interventions, the first measurements were obtained from all patients in both groups using the patient identification form, Yosipovitch pruritus questionnaire, and laboratory index registration form. In the SSBM group, massage was applied from the neck to down the back near the spine based on the SSBM procedure of Elisabeth *et al*. three times a week for four weeks during HD for ten minutes [18]. In the acupressure group, acupressure was performed rotationally at a pressure of 3-4 kg for ten minutes on points LI 11 (on the outside end of the crease on the elbow) and SP 10 (with the knee flexed, above the superior medial border of the patella on the bulge of the medial portion of vastus medialis) for 5 minutes each. The correctness of the pressure was confirmed when the person felt warm, swollen, and heavy [19]. All procedures were performed by the research team under the supervision of a Chinese medicine specialist. One week after the interventions, the second measurements were obtained by reapplying scales to all groups.

5. Measurement tools

5.1 The Laboratory Index Registration Form: To assess laboratory parameters, 5 CC IV blood samples were taken from each patient before and after their intervention and sent to the laboratory. Potassium was measured by electrolyte analyzer (Medica EasyLyte® – USA), and C-reactive protein (CRP), and phosphorus were measured by chemical autoanalyzer (Birui- China).

5.2 Yosipovitch pruritus questionnaires (YPQ): This questionnaire measures different dimensions of pruritus in eight areas: pruritus history, current antipruritic medications, effect on sleep, effect of pruritus on daily activities and habits, coping with pruritus and quality-of-life measures, verbal descriptor scale of itch sensation and affective dimension, severity of pruritus, and pruritus location. The interpretation of the YPQ in the areas of pruritus history, current antipruritic medications, and the effect of pruritus on daily activities and habits was done descriptively. Sleep scores range from 0 to 2 based on using antipruritic drugs (0= never, 1= sometimes, and 2= always). The final score of the effect of pruritus on the quality of life is the sum of the scores (range between 0 and 4). The final score of the verbal descriptor scale of itch sensation and affective dimension was obtained by dividing the score obtained by the patient by the maximum possible score (range of scores between 0 and 1). The severity of pruritus is measured in 3 sub-areas and based on the scoring scale, a score between 0 and 10 is assigned to each sub-area. In the pruritus location, scoring is based on the rule of nines for burns and the range of scores is between 0 and 100. Higher scores indicate more severe pruritus. In the study of Yosipovitch *et al* reliability was high ($r = 0.72$, $p < 0.01$) [20]. Adapted to Persian by Abbasi *et al*, YPQ is used to assess the frequency of uremic pruritus and its associated factors in HD patients. Cronbach's Alpha value was 0.68 in this study [21].

6. Ethical considerations

At the start of the study, researchers explained the objective and methods to patients, and then patients signed a written informed consent form. Confidentiality and anonymity were guaranteed, and gender compatibility was observed between patients and interventioners. The study was approved by the Research Ethics Committee of MUMS (No: IR.MUMS.NURSE.REC.1399.030) and registered at the IRCT website (reference number: IRCT20200727048223N1).

7. Statistical analysis

Data were analyzed with SPSS 21. Baseline characteristics were expressed as frequencies (percentages) for categorical variables, mean ± SD for continuous normally distributed variables. Before and after group comparison, independent t-test and Mann-Whitney statistical tests were used. Wilcoxon, paired t-test, and McNemar were used to compare before and after in the field of massage and acupressure interventions. To compare the effectiveness of the two intervention groups on the dependent variables, the Generalized estimating euation (GEE) test was used. Spearman's correlation test was also used to determine the correlation between intervening variables and dependent variables.

Results

1. Patient Baseline Characteristics

Upon the initial assessment, a total of 49 HD patients having pruritus disturbance due to CKD-aP were eligible. In accordance with the results obtained, the participants' mean ± SD of age was 54.98 ± 10.79 years, the HD duration was 48.14 ± 43.52 years, and the CDK duration was 56.26 ± 44.39 months. The majority of the participants were men (60%), married (49%), and had a Diploma education (32%). No significant differences were observed between the two groups in terms of demographic and clinical details such as age, gender, marital status, employment status, education, HD duration, CDK duration, dialysis efficiency (Kt/V), primary disease diagnosis, skin temperature, and HD solution temperature ($p > 0.05$; Table 1).

Table 1: Demographic and clinical characteristics of patients in the SSBM and acupressure groups.

Characteristic	Groups			P value
	All patients (n=49)	Acupressure group (n=24)	SSBM group (n=25)	
Gender				
Female, n (%)	20(40)	9(37.5)	11(42.5)	0.72[a]
Male, n (%)	30(60)	15 (57.7)	15(62.5)	
Age (year)				
mean (SD)	54.98 ± 10.79	53.25 ± 11.48	56.57 ± 10.07	0.28[c]
Education, n (%)				
Illiterate	5(10)	2(8.3)	3(11.5)	
Primary level	6(12)	1(4.2)	5(19.2)	
Secondary level	9(18)	3(12.5)	6(23.1)	0.29[a]
Diploma	16(32)	9(37.5)	7(26.9)	
Post-graduation or higher	14(28)	9(37.5)	5(19.2)	
Duration of hemodialysis, months, mean (SD)	48.14 ± 43.52	55.50 ± 53.25	41.45 ± 31.67	0.37[b]
Duration of kidney disease, months, mean (SD)	56.26 ± 44.39	65.17 ± 54.29	48.04 ± 31.66	0.28[b]
Dialysis efficiency (Kt/V)	1.3 ± 0.23	1.33 ± 0.25	1.27 ± 0.22	0.09[c]
Primary disease diagnosis				
Chronic glomerulonephritis, n (%)	24(48)	11(45.8)	13(50)	
Diabetic nephropathy, n (%)	13(26)	5(20.8)	3(11.5)	0.15[a]
Hypertensive nephropathy, n (%)	8(16)	5(20.8)	8(30.8)	
Other primary diseases, n (%)	5(10)	3(12.5)	2(7.7)	
Skin temperature (°C)	36.56 ± 0.49	36.60 ± 0.5	36.53 ± 0.5	0.29[b]
Hemodialysis solution	37.04 + 0.26	37.02 + 0.33	37.05 + 0.29	0.53[b]

temperature (°C)				
Job status n (%)				
Retired	33(66)	14(58.3)	19(73.1)	0.27[a]
Employed	17(34)		10(41.7)	7(26.9)
Marital status n (%)				
Married	49(98)	24(100)	25(96.2)	0.52[a]
Widow/Widower	1(2)	0(0)	1(3.8)	

a; Chi square test, b; Mann-Whitney test, c; Independent T-test.

Table 2 shows the laboratory clinical values of participants at baseline and after intervention. No significant differences were detected between the groups in these baseline biochemical parameters ($p > 0.05$). The paired t-test showed a significant reduction in serum levels of phosphorus and CRP in both groups after intervention ($p > 0.05$). No significant differences were observed in serum levels of potassium between the two groups before and after the intervention.

Table 2: Comparison of the laboratory parameters among the SSBM and acupressure groups in two phases (baseline and after the intervention).

Laboratory parameters	Groups				*p*-value pre-test[a]
	SSBM group		Acupressure group		
	Before	After	Before	After	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Potassium (mg/dl)	4.93(0.72)	5.06(0.68)	4.76(0.71)	4.68(0.13)	0.403
p-value[b]	0.351		0.981		
Phosphorus (mg/dl)	6.9(1.33)	5.08(1.22)	5.92(0.93)	5.67(0.95)	0.135
p-value[b]	0.00		0.004		
CRP (mg/L)	39.51(20.02)	31.23(16.57)	34.75(14.83)	30.04(14.29)	0.348
p-value[b]	0.00		0.002		

a. Independent T-test
b. Paired T-test

Interventions effects

There were no significant differences between the SSBM and acupressure groups in any dimension of pruritus before and after 5 weeks. Also, according to the GEE statistical test, there was no significant difference between the effectiveness of the two intervention groups on any of the variables ($P>0.05$). Although, both interventions showed a significant effect on different dimensions of skin pruritus in patients (Tables 3, 4, 5, Figure 2 and 3).

Pruritus history: For most patients before the intervention, 53% had itch duration of fewer than thirty minutes and 41% had more than one hour in SSBM and acupressure groups, respectively. after the intervention, the duration of itching reached less than thirty minutes for both groups (88% and 100%, respectively). Pruritus based on the time of HD for the majority of patients before the intervention in both groups was before the time of dialysis, and after the intervention in both groups, the time of itching in most patients reached during dialysis (84%, P=0.035 and 70%, P=0.041 in SSBM and acupressure groups, respectively). For symptoms accompanied by pruritus, daily appearance, and the starting and ending signs of pruritus no significant differences between both groups before and after interventions (Table 3).

Table 3: Comparison of patients' history among the SSBM and acupressure groups in two phases (baseline and after the intervention).

Groups	SSBM group			Acupressure group			p value
	Before	After	p value	Before	After	p value	
Duration of skin pruritus			<0.001 [a]			<0.001[a]	0.191 [b]
< 30 minutes	14(53.8)	23(88.5)		6(25)	24(100)		
0.5-1 hour	4(15.4)	1(3.8)		8(33.3)	0		
>1 hour	8(30.8)	2(7.7)		10(41.7)	0		
Symptom accompanied by pruritus			1 [a]			1 [a]	
Pain	4(16.7)	4(16.7)		5(19.2)	5(19.2)		
Sweating	6(25)	6(25)		2(7.7)	2(7.7)		
Heat	10(41.7)	10(41.7)		17(65.4)	17(65.4)		
Cold	4(16.7)	4(16.7)		2(7.7)	2(7.7)		
The onset sign of pruritus			1 [a]			1 [a]	
Heat	15(57.6)	15(57.6)		12(50)	12(50)		
Sweating	18(75)	18(75)		13(54.1)	13(54.1)		
Anxiety	5(19.2)	5(19.2)		8(33.3)	8(33.3)		

Pain	9(37.5)	9(37.5)		6(25)	6(25)	
The ending sign of pruritus			1 [a]			1 [a]
Cool environment	14(53.8)	14(53.8)		15(62.5)	15(62.5)	
Distraction	12(46.1)	12(46.1)		10(41.6)	10(41.6)	
Scratching	7(26.9)	7(26.9)		5(20.8)	5(20.8)	
Pruritus based on hemodialysis time			0.035 [a]			0.041 [a]
Before dialysis	15(57.7)	2(7.7)		14(58.3)	3(12.5)	
During dialysis	2(7.7)	22(84.6)		4(16.7)	17(70.8)	
After dialysis	9(36.6)	2(7.7)		6(25)	4(16.7)	
Pruritus based on circadian rhythm						0.442 [c]
Day	10(38.5)	10(38.5)		9(37.5)	9(37.5)	
Night	16(61.5)	16(61.5)		15(60.5)	15(60.5)	

Data are presented as No. (%). a; Wilcoxon test, b; Generalized estimating equation, c; McNemar's test, SSBM; slow stroke back massage.

Current antipruritic medications: After the interventions, the long-term effects of the medications appeared in a larger number of patients (33%, P<0.001 and 66%, P=0.004 in the SSBM and acupressure groups, respectively; Table 4).

Table 4: Comparison of duration effect of antipruritic medications among the SSBM and acupressure groups in two phases (baseline and after the intervention).

Groups	SSBM group			Acupressure group		
	Before	After	P value	Before	After	P value
Duration effect of antipruritic medications			0.001 [a]			0.004 [a]
No effect	9(45)	2(10)		7(38.8)	0(0)	
Short term effects	9(45)	1(5)		5(27.7)	6(33.3)	
Long term effects	2(10)	17(85)		6(33.3)	12(66.6)	

Data are presented as No. (%). a; Wilcoxon test, SSBM; slow stroke back massage.

Sleep: Effect on sleep: All patients in both groups had difficulty falling asleep before the intervention. After 5 weeks, 84% and 58% of the patients did not have sleep problems caused by itching in SSBM and acupressure groups, respectively. Also, the consumption of sleeping pills in patients of both groups has decreased significantly (P<0.0001 and P<0.0001 in SSBM and acupressure groups, respectively; Figure 2 a).

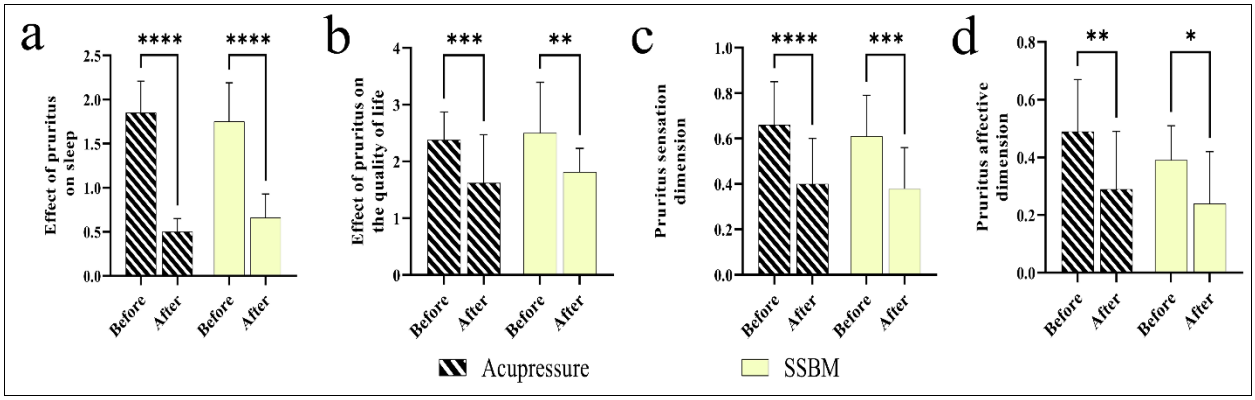

Fig 2: Mean change in (a) sleep, (b) quality-of-life, (c) verbal descriptor scale of itch sensation dimension, and (d) itch affective dimension in baseline and after 5 weeks, according to the intervention group. Asterisks indicate significant changes (*P<0.05, **P<0.01, ***P<0.001, and ****P<0.0001). SSBM; slow stroke back massage.

Quality-of-life: The mean overall score of patients' quality of life before the intervention was 2.3 ± 0.47 and 2.4 ± 1.61, which decreased to 1.6 ± 0.85 and 1.4 ± 1.44 after the end of the study (P<0.001 and P<0.001; in SSBM and acupressure groups, respectively; Figure 2 b).

Pruritus sensation and affective dimension: The average score of the sensation dimension after the intervention for the SSBM group went from 0.68 ± 0.19 to 0.63 ± 0.2 and for the acupressure group from 0.63 ± 0.19 to 0.47 ± 0.18 (P<0.001 and P<0.001, respectively; Figure 2 c). These changes were statistically significant for each group. Also, the average scores of the affective dimension after the intervention for the SSBM group decreased from 0.5 ± 0.18 to 0.29 ± 0.2 and for the acupressure group from 0.45 ± 0.19 to 0.24 ± 0.18, which is statistically significant (P<0.001 and P<0.001, respectively; Figure 2 d).

Daily activities: At the beginning of the study, more than 40% of patients in both groups declared sweat, dryness,

anxiety and activity as aggravating factors and bathing with cold water, ambient environment, and rest as alleviating factors. The interventions did not change any of the factors in both groups (Table 5).

Table 5: Comparison of pruritus on daily activities and habits among the SSBM and acupressure groups in two phases (baseline and after the intervention).

Groups	SSBM group			Acupressure group		
	Before	After	P value	Before	After	P value
Aggravating factors of pruritus			1 [a]			1 [a]
sweat	20(76.9)	20(76.9)		17(70.8)	17(70.8)	
dryness	17(65.3)	17(65.3)		10(41.6)	10(41.6)	
anxiety	14(53.8)	14(53.8)		17(70.8)	17(70.8)	
activity	13(50)	13(50)		14(58.3)	14(58.3)	
Alleviating factors of pruritus			1 [a]			1 [a]
Bathing with cold water	19(79.1)	19(79.1)		13(54.1)	13(54.1)	
Ambient environment	13(50)	13(50)		16(66.6)	16(66.6)	
Rest	11(42.3)	11(42.3)		10(41.6)	10(41.6)	
Hot shower	7(26.9)	7(26.9)		5(20.8)	5(20.8)	

Data are presented as No. (%). a; Wilcoxon test, SSBM; slow stroke back massage.

The severity of pruritus: The results of Figure 3 show, after the intervention, the average scores of itching intensities at the current moment, maximum itching intensity, and minimum itching intensity in the SSBM group went from 6.19 ± 1.96, 8.15 ± 1.73, and 2.62 ± 1.02 to 3.88 ± 1.79, 5.73 ± 1.86, and 2.54 respectively and for acupressure group from 5.54 ± 1.86, 7.38 ± 1.78, and 2.21 ± 1.2 decreased to 4.08 ± 1.74, 5.32 ± 1.47, and 2.17 ± 0.7. This decrease in both groups was statistically significant for the maximum intensity and the intensity of pruritus at the present (P<0.0001 and P<0.001 for the acupressure group and P<0.001 and P<0.05 for the SSBM group, respectively).

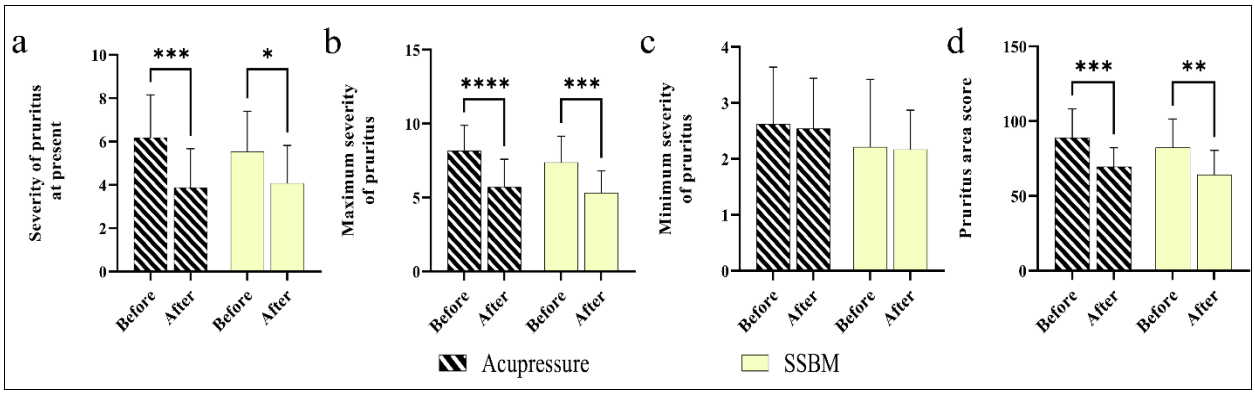

Fig 3: Mean change in (a) the severity of pruritus at the present, (b) maximum severity of pruritus, (c) minimum severity of pruritus, and (d) location of pruritus in baseline and after 5 weeks, according to the intervention group. Asterisks indicate significant changes (*P<0.05, **P<0.01, ***P<0.001, and ****P<0.0001). SSBM; slow stroke back massage.

Location of pruritus: The most noticeable change in the location of pruritus for both intervention groups was a decrease in general body itching. Figure 3 d shows that the location of pruritus score was significantly reduced in the SSBM and acupressure groups (P<0.01 and P<0.001, respectively).

Discussion

HD can have several complications, but using CAM therapies can help reduce them. This study is the first RCT to evaluate the effect of massage and acupressure on pruritus. The findings showed a significant reduction in pruritus severity in HD patients in both the acupressure and SSBM groups. Both interventions had a positive effect on alleviating pruritus, but there was no difference between them.

In people with kidney disease, the kidneys are unable to filter and remove excess phosphorus from the bloodstream. Increased phosphorus levels can disrupt the balance between calcium and phosphorus in the body [22]. This imbalance can lead to the deposition of calcium phosphate crystals in the skin, which leads to itching and discomfort [23]. The present study showed that the severity of pruritus based on HD time and duration of pruritus in the patients decreased significantly after receiving interventions. Also, this decrease was associated with a significant decrease in serum phosphorus levels in patients. It is believed that hyperphosphatemia may contribute to skin irritation and inflammation, which can lead to pruritus. Therefore, reducing blood phosphorus is an important factor in improving skin pruritus [24]. Evidence shows that acupressure and massage reduce blood phosphorus levels in HD patients. These treatments may improve blood flow to the kidneys and remove excess phosphorus from the body [25, 26].

The results of our study showed that SSBM and acupressure improved the effect of anti-pruritus drugs on patients. Several studies have investigated the effects of acupressure and massage on the duration of the effect of drugs in patients [27]. The results of Lee *et al.*'s study showed that

acupressure was effective in prolonging the effect of topical corticosteroids in patients with atopic dermatitis [28]. It is believed that these treatments increase the absorption of medicine in the skin by releasing endorphins, which are a natural pain reliever produced by the body. The release of endorphins can help reduce itching and improve the patient's perception of symptom relief [29]. Probably, the stimulation of endorphin-dependent neural pathways has improved the effect of anti-itch drugs after the interventions in the present study. It can be claimed that SSBM and acupressure, through their actions and physiological effects on the body of patients, have created a more suitable platform for the effects of anti-itching medications in them. As it has been acknowledged, the adjustment of the dosage and type of medications taken by patients should be in accordance with the type of massage [30]. However, the interventions of the present study were designed with the aim of influencing the systemic nature of skin itching in these patients, and it does not seem that the direct and specific effect of the interventions has increased the effectiveness of anti-pruritus medications.

Evidence from past studies shows that about half of dialysis patients identified itching as the cause of sleep problems [31]. SSBM and acupressure techniques often involve applying pressure to specific points or areas of the body, which can improve blood circulation. Better circulation may help relax muscles, reduce pain, and create a more conducive environment for sleep. The results of the present study showed that acupressure and massage improve sleep quality in patients by reducing skin pruritus. Tsay and colleagues found that acupressure applied to the Shenmen points of the wrists improved the sleep quality of dialysis patients, indicating the effectiveness of this method among HD patients [32]. Similarly, Nasiri and colleagues conducted a study that supported the improvement of sleep quality in HD patients through acupressure, with both the control and intervention groups showing positive results [33]. Arab and colleagues' findings showed that acupressure resulted in a short-term enhancement of sleep quality in HD patients [34]. The findings of Menekli *et al*. suggest that massage therapy has reduced itching and improved the sleep quality of HD patients [35]. Therefore, acupressure and massage appear to be promising complementary therapy for improving the sleep quality of HD patients.

Rehman *et al*. examined the effect of acupressure therapy on foot acupoints among patients suffering from CKD-aP [36]. The results suggested that acupressure could enhance the quality of life in patients. It should be noted that Rehman *et al*. addressed point KI-1 acupressure in patients during 8 weeks, which is different from our study. Acupressure in the present study achieves a similar result by using more points and a shorter time. Wang *et al*. verified the effect of auricular acupressure 3 to 5 times a day for 3 months in increasing the quality of life in diabetic patients with CKD [10]. Mohammadpour *et al*. investigated the effect of massage with lavender oil on quality of life in patients undergoing HD. The intervention was performed in 12 sessions, and the time of each session was 20 minutes [37]. The results displayed that massage brings about a positive impact on the quality of life of these patients, which is in line with the present study. But in the present study, the absence of aromatic oil and less intervention time in each session can be considered as advantages. Overall, the positive effects of massage and acupressure on quality of life may be due to their ability to promote relaxation, reduce tension and pain, and improve overall mood and well-being [9, 38].

The results of the present study indicated a significant decrease in the mean score of sensation and affective dimensions of skin itching in both intervention groups ($P<0.01$), although no difference was observed in the effectiveness of the two interventions ($P>0.05$). In line with this research finding, Yuspevich *et al*. reported a significant relationship between the itch sensation and affective dimensions and the intensity of skin itching [20]. Sabouhi *et al*. showed that acupressure could significantly reduce fatigue mean scores in the emotional and sensory dimensions of patients admitted to the HD ward [39]. Other studies have also confirmed the impact of acupressure on emotional and sensory dimensions in patients [40, 41]. These techniques stimulate the nerve endings in the skin, which can create a counter-sensation to the itchiness. By focusing on the areas surrounding the itchy region, such as the surrounding muscles, ligaments, and connective tissues, massage, and acupressure can divert attention away from the itch and provide a soothing sensation [42]. Itching can be a distressing experience, causing frustration, irritation, and discomfort. The emotional dimension of itching refers to the psychological and emotional impact it has on an individual [43]. Massage and acupressure can address this aspect by promoting relaxation and reducing stress [12]. The effectiveness of interventions on these dimensions in patients can be expected due to the existence of a significant direct relationship between the intensity of skin itching and the sensation and affective dimensions of itching, as well as the temporal compatibility of interventions in these dimensions.

Chronic itching can be a significant source of stress and discomfort and can interfere with daily activities such as sleep, work, and social interactions [44]. In line with our study, it has been reported that the most common factors that increase skin itching in HD patients are rest, dryness, heat, and sweat, and the most important alleviating factors of pruritus are bathing with cold and hot water [20, 45]. The present study shows that both interventions have no effect on changes in daily activities and habits.

Our results show that acupressure and massage have reduced the severity of pruritus in patients. One reason for the effectiveness of massage and acupressure in reducing the severity of pruritus is that they can help to increase blood flow and lymphatic drainage in the affected areas. This can help to reduce inflammation and promote healing, which can improve the overall health of the skin and reduce the frequency and intensity of pruritus [46]. Yan *et al*. conducted a clinical trial to determine the effect of acupressure on pruritus in HD patients. Acupressure was administered three times a week for six weeks, with each session lasting 15 minutes [31]. The results showed that the intervention reduced pruritus in these patients, consistent with the present research. However, the duration of the intervention, acupressure points, and methods differed between the two studies. In addition, massage and acupressure can help individuals to break the cycle of pruritus and scratching, which can exacerbate the condition and increase the severity of symptoms. By promoting relaxation and reducing stress levels, massage and acupressure can help individuals to manage their urge to scratch, which can prevent further irritation and damage to the skin [31].

Our study showed that CRP levels decreased after CAM interventions. CRP is a blood parameter that is often used as a marker of inflammation in the body. Studies have shown that elevated levels of CRP are associated with an increased risk of pruritus in dialysis patients. Inflammatory processes triggered by increased CRP levels could potentially affect nerve fibers in the skin, leading to heightened sensitivity and pruritus sensations). The results of our study show that CAM interventions have reduced the location of pruritus in patients. A possible explanation for the reduction in the location of pruritus caused by acupressure and SSBM is the reduction in the levels of inflammatory markers in the patients. Several studies have investigated the effect of acupressure and massage on reducing inflammation and CRP levels in the body. One study conducted on individuals with osteoarthritis found that acupressure resulted in a significant reduction in CRP levels, as well as improvements in pain and physical function [48]. Another study conducted on cardiovascular patients found that massage therapy resulted in a significant reduction in CRP levels, as well as significant increase in peak oxygen consumption [49]. Potassium plays a crucial role in various physiological processes, including nerve function. Elevated or low potassium levels can disrupt nerve signaling and potentially trigger itching [50]. However, our results suggest that acupressure and massage cannot change blood potassium levels. It's worth noting that individual responses can vary, and not all dialysis patients will experience itching due to potassium abnormalities.

Conclusion

Overall, this study suggests that SSBM and acupressure may be useful treatments for managing pruritus in HD patients. Acupressure and SSBM, being simple, inexpensive, and safe, can be used as complementary therapy for reducing uremic pruritus in HD patients. However, our study found no difference between the two CAM methods in improving patients' pruritus.

Statement from the Sanctioned Country

All authors were employed at the School of Medicine at Mashhad University of Medical Sciences and Kashmar University of Medical Sciences, where research and education are the main focus.

Authors' Contribution

SS: get the idea, data viability. SS and HPT: designed and data acquisition. JJ: data analysis. TP: supervised the study. SS and TP: wrote the original manuscript version. SS, HBT, JJ, and TP had contributions in the interpretation of data and manuscript editing. All authors have read and confirmed the final draft.

Conflict of Interests

The authors have no conflict of interests to declare regarding this study.

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