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The Effect of Seated Baduanjin Exercise on Psychological State, Fatigue Symptoms, and Quality of Life in Maintenance Hemodialysis Patients

Jun Li*, Zhaohua Zou, Xinjie Cheng

Deyang People's Hospital, Deyang 618000, Sichuan Province, China

Corresponding author: Jun Li, lj9carol@163.com

Abstract: *Objective:* To evaluate the intervention effects of seated Baduanjin exercise on patients undergoing maintenance hemodialysis (MHD). *Methods:* A total of 108 MHD patients admitted between July 2022 and July 2023 were selected. They were randomly assigned into two groups: the experimental group, with 55 patients, who received seated Baduanjin exercise combined with leg exercises during dialysis; and the control group, with 53 patients, who only performed leg exercises during dialysis. The psychological state, fatigue symptoms, quality of life, and sleep quality scores were compared between the two groups, and exercise endurance was recorded. *Results:* After the intervention, the psychological state scores in the experimental group were lower than those in the control group, the fatigue symptom scores were lower, the quality of life scores were higher, the sleep quality scores were lower, and the exercise endurance was higher ($P < 0.05$). *Conclusion:* Seated Baduanjin exercise can improve the negative psychological state and fatigue symptoms of MHD patients, enhance their quality of life and sleep quality, and effectively increase their exercise endurance.

Keywords: Seated Baduanjin exercise; Maintenance hemodialysis; Psychological state; Fatigue symptoms; Quality of life

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1. Introduction

Maintenance hemodialysis (MHD) is a common treatment method for end-stage renal disease (ESRD) patients. It helps clear toxins from the body, preserve residual kidney function, and thus prolong patients' survival [1]. However, MHD patients often experience reduced life ability and cognitive function abnormalities, leading to sleep disorders and negative psychological states, which affect their treatment compliance. To ensure the smooth and effective treatment of MHD patients, they are often treated with sedatives, analgesics, and other medications, but these have numerous side effects, making it necessary to seek simple and reliable nonpharmacological interventions.

Seated Baduanjin is a widely practiced form of Qigong that involves continuous and gentle movements. It combines dynamic and static postures, balancing relaxation and tension, thus improving the overall condition of patients and increasing their motivation for treatment [2]. Additionally, seated Baduanjin can cultivate patients' emotions, integrating mind and body, and helping to improve their psychological state. Based on this, this study selected 108 MHD patients to evaluate the advantages of seated Baduanjin exercise as an intervention.

2. Materials and methods

2.1. General information

A total of 108 MHD patients admitted between July 2022 and July 2023 were selected. They were randomly divided into two groups. The experimental group consisted of 55 patients, 30 males and 25 females, aged between 60 and 80 years, with an average age of (69.20 ± 4.18) years. Their hemodialysis duration ranged from 12 to 150 months, with an average of (57.95 ± 6.71) months. The control group consisted of 53 patients, 34 males and 19 females, aged between 60 and 83 years, with an average age of (71.02 ± 4.39) years. Their hemodialysis duration ranged from 4 to 183 months, with an average of (53.62 ± 6.84) months. A comparison of the general information between the two groups showed no statistically significant differences ($P > 0.05$).

Inclusion criteria: (1) MHD treatment duration longer than 1 month; (2) life expectancy longer than 3 months; (3) age over 60 years; (4) informed and agreed to participate in the study.

Exclusion criteria: (1) Accompanying mental disorders; (2) abnormal limb motor function; (3) difficulty in independently completing the study.

2.2. Methods

The control group performed leg exercises during dialysis: patients were given a health manual, explaining the specific methods and key points of the leg exercises. Each patient was given an exercise logbook and asked to record their exercise details. They were guided to perform leg lifts, knee bends, and quadriceps contractions, with each session lasting 15 minutes, 3 times a week, for 12 weeks.

The experimental group performed seated Baduanjin exercises in addition to leg exercises: healthcare workers demonstrated the seated Baduanjin exercises on-site, while also playing instructional videos explaining the key points of the movements. There are 8 movements in total:

(1) Movement 1: "Hands Raise to Regulate the Triple Burner";

(2) Movement 2: "Drawing the Bow to Shoot the Hawk";

(3) Movement 3: "Separating Heaven and Earth to Regulate the Spleen and Stomach";

(4) Movement 4: "Looking Back to Relieve the Five Fatigues and the Seven Injuries";

(5) Movement 5: "Swaying the Head and Tail to Get Rid of Heart Fire";

(6) Movement 6: "Holding the Feet to Strengthen the Kidneys and Waist";

(7) Movement 7: "Clenching the Fists with Eyes Glared to Increase Strength";

(8) Movement 8: "Bouncing on the Toes to Cure All Diseases."

The training was conducted before each dialysis session, with each session lasting 15 minutes, repeating the 8 movements, for 12 weeks. Patients were also given a health manual and an exercise logbook related to the training, and their training outcomes were regularly assessed.

2.3. Observation indicators

(1) Psychological state: Assessed using the Self-Rating Anxiety Scale (SAS), which contains 20 items and uses a Likert-4 point scale. The rough score is 80 points, and the standard score is 100 points, with a score > 50 indicating the presence of anxiety. The higher the score, the more severe the anxiety.

(2) Fatigue symptoms: Assessed using the Chinese version of the Brief Fatigue Inventory (BFI-C). The total score of the scale divided by 9 is the fatigue score. Mild fatigue: 1–3 points, moderate fatigue: 4–6 points, severe fatigue: 7–10 points.

(3) Quality of life: Assessed using the Kidney Disease Quality of Life-Short Form (KDQOL-SFTM), which contains two parts. The first part, the Kidney Disease and Dialysis-Related Quality of Life Scale (KDTA), consists of 43 items across 11 dimensions; the second part, the General Health-Related Quality of Life Scale (SF-36), consists of 36 items across 8 dimensions. A higher score indicates a higher quality of life.

(4) Sleep quality: Assessed using the Pittsburgh Sleep Quality Index (PSQI), which includes 5 evaluation items, subdivided into sleep disorders, daytime functioning, sleep quality, etc. A lower score indicates better sleep quality.

(5) Exercise endurance: Evaluated using the 6-minute walk test (6MWT). Method: A 30-meter straight line was marked in the hospital corridor, with a marker at the start and finish to prevent interference. Patients were instructed to wear sports shoes and walk back and forth within this distance, and the distance covered in 6 minutes was recorded.

2.4. Statistical analysis

Data were processed using SPSS 28.0. Measurement data were expressed as mean ± standard deviation (SD), and *t*-tests were used for comparison and verification. Count data were expressed as [*n* (%)], and chi-squared (χ^2) tests were used for comparison and verification. Statistical significance was set at $P < 0.05$.

3. Results

3.1. Comparison of psychological state scores between the two groups

Before the intervention, there was no significant difference in SAS scores between the two groups ($P > 0.05$). After the intervention, SAS scores in both groups were lower than before, with the experimental group having lower scores than the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of psychological state scores between the two groups (mean ± SD, points)

Group	*n*	Pre-intervention	Post-intervention	*t*	*P*
Experimental group	55	64.04 ± 4.71	58.45 ± 3.05	7.291	0.000
Control group	53	64.94 ± 3.62	63.66 ± 2.18	2.216	0.029
t	-	1.110	10.179	-	-
P	-	0.269	0.000	-	-

3.2. Comparison of fatigue symptom scores between the two groups

Before the intervention, there was no significant difference in fatigue symptom scores between the two groups

($P > 0.05$). After the intervention, fatigue symptom scores in both groups were lower than before, with the experimental group having lower scores than the control group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of fatigue symptom scores between the two groups (mean ± SD, points)

Group	*n*	Pre-intervention	Post-intervention	*t*	*P*
Experimental group	55	7.18 ± 1.44	4.13 ± 0.57	14.371	0.000
Control group	53	7.10 ± 1.10	4.79 ± 0.64	13.274	0.000
t	-	0.324	5.664	-	-
P	-	0.747	0.000	-	-

3.3. Comparison of quality-of-life scores between the two groups

Before the intervention, there was no significant difference in quality-of-life scores between the two groups ($P > 0.05$). After the intervention, quality of life scores in both groups were higher than before, with the experimental group having higher scores than the control group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of quality-of-life scores between the two groups (mean ± SD, points)

Group	*n*	KDTA score				SF-36 score			
		Pre-intervention	Post-intervention	*t*	*P*	Pre-intervention	Post-intervention	*t*	*P*
Experimental group	55	40.59 ± 5.32	68.17 ± 6.33	24.546	0.000	30.56 ± 3.14	61.57 ± 5.10	38.204	0.000
Control group	53	40.51 ± 5.29	61.27 ± 6.28	18.606	0.000	32.11 ± 3.27	57.12 ± 5.05	30.661	0.000
t	-	0.078	5.685	-	-	2.513	4.555	-	-
P	-	0.938	0.000	-	-	0.013	0.000	-	-

3.4. Comparison of sleep quality (PSQI scores) between the two groups

Before the intervention, there was no significant difference in PSQI scores between the two groups ($P > 0.05$). After the intervention, PSQI scores in both groups were lower than before, with the experimental group having lower scores than the control group ($P < 0.05$), as shown in **Table 4**.

Table 4. Comparison of sleep quality (PSQI scores) between the two groups (mean ± SD, points)

Group	*n*	Pre-intervention	Post-intervention	*t*	*P*
Experimental group	55	13.93 ± 2.02	10.38 ± 1.27	10.887	0.000
control group	53	13.79 ± 1.98	12.02 ± 1.44	5.296	0.000
t	-	0.364	6.283	-	-
P	-	0.717	0.000	-	-

3.5. Comparison of exercise endurance (6MWT distance) between the two groups

Before the intervention, there was no significant difference in 6MWT distances between the two groups ($P > 0.05$). After the intervention, 6MWT distances in both groups were greater than before, with the experimental group showing greater improvements than the control group ($P < 0.05$), as shown in **Table 5**.

Table 5. Comparison of exercise endurance (6MWT distance) between the two groups (mean ± SD, meters)

Group	n	Pre-intervention	Post-intervention	*t*	*P*
Experimental group	55	386.25 ± 16.32	422.31 ± 10.33	13.662	0.000
Control group	53	380.96 ± 17.60	395.21 ± 10.26	5.116	0.000
t	-	1.620	13.675	-	-
P	-	0.108	0.000	-	-

4. Discussion

The high incidence of ESRD is associated with factors such as poor dietary habits, deteriorating living environments, and aging. It is a common public health issue that negatively impacts patients' physical and mental health, posing significant health risks [3]. Maintenance hemodialysis (MHD) is the fundamental therapy for ESRD, aiming to extend the survival of patients and improve their quality of life. However, long-term MHD treatment often leads to complications like malnutrition and anemia, causing significant fatigue symptoms that hinder patients' ability to effectively cooperate with treatment. Previous studies have shown that reduced exercise capacity is a major risk factor for malnutrition-inflammation syndrome and systemic micro-inflammation, and MHD significantly reduces patients' exercise capacity and activity levels [4]. This creates a vicious cycle, further diminishing muscle strength and exhausting residual cardiovascular function, which affects patients' self-care ability and leads to psychological and sleep disturbances [5].

Exercise training is a common intervention for MHD patients, as it can improve muscle strength, muscle volume, and insulin resistance in ESRD patients. The rhythmic contraction of muscles during exercise helps reduce systemic inflammation. Long-term aerobic exercise can also regulate heart rate variability and prevent cardiovascular complications in ESRD. Additionally, it can improve patients' nutritional status and enhance their disease resistance, making it a highly feasible intervention [6].

Seated Baduanjin, an exercise method derived from traditional Baduanjin, is suitable for patients with poor physical strength and impaired physiological function, such as those undergoing MHD. Its training method is simple, with each session lasting around 15 minutes, making it highly tolerable for patients. As a moderate-intensity exercise, Seated Baduanjin focuses on regulating the body, breath, and mind, allowing patients to relax physically and mentally. The deep breathing exercises involved help regulate organ function, improve psychological well-being, and alleviate fatigue symptoms [7]. Moreover, the gentle and slow movements of Seated Baduanjin help stimulate meridians, enhance physical fitness, and improve blood circulation, making it an ideal aerobic exercise for MHD patients.

The results showed that the psychological state scores of the experimental group after the intervention were lower than those of the control group, and their fatigue symptoms were also lower ($P < 0.05$). This result aligns with the findings of Shen and Liu [8]. The analysis suggests that Seated Baduanjin may regulate neurotransmitter levels such as dopamine or serotonin, thereby improving psychological state. The involvement of healthcare professionals as guides in the exercise can enhance patients' motivation to exercise and help them recognize the positive effects of regular physical activity on recovery, further improving their mental state. As a result, patients can relax during Baduanjin practice, focusing entirely on the exercise and experiencing a sense of ease, which helps alleviate fatigue symptoms.

The quality of life scores of the experimental group after the intervention were higher than those of the control group, while their sleep quality scores were lower ($P < 0.05$). The analysis suggests that Seated Baduanjin can enhance communication between healthcare providers and patients, improve interpersonal relationships, and boost patients' physical and psychological health, thereby optimizing their quality of life [9]. Additionally, this exercise can regulate blood circulation, improving sleep quality.

The exercise endurance of the experimental group after the intervention was higher than that of the control group ($P < 0.05$). The analysis suggests that Seated Baduanjin helps regulate energy flow and conserve vitality, improving blood circulation and internal body functions, which reduces patients' psychological resistance to exercise and encourages them to participate in regular training [10]. The gradual improvement in muscle strength and muscle blood flow brought about by Baduanjin enhances physical fitness and exercise endurance.

However, this study has certain limitations, such as the relatively short study duration, being a single-center study, and the small sample size. Future studies could extend the research period and conduct multi-center and large-sample studies to comprehensively evaluate the benefits of Seated Baduanjin exercises.

5. Conclusion

In conclusion, implementing Seated Baduanjin for MHD patients can improve their psychological state, fatigue symptoms, quality of life, and sleep quality, as well as enhance their exercise endurance, making it a valuable therapeutic option.

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Disclosure statement

The authors declare no conflict of interest.

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