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Dialysis Symptoms on Exercise Perception of Hemodialysis Patients

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ABSTRACT

Objective: Hemodialysis patients suffer from many symptoms which may affect the exercise perception. This research was conducted descriptively and relationally to determine the effect of dialysis symptoms on exercise perception in hemodialysis patients.
Methods: The study was conducted with 120 hemodialysis patients, who have been treated at the Organ Transplantation and Dialysis Hospital of a university, met the inclusion criteria, and agreed to participate in the study. Questionnaire form, Dialysis Symptom Index, and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale were used to collect data.
Results: In the study, the mean Dialysis Symptom Index score of hemodialysis patients was 77 $\pm$ 23.5, and the most common symptom was fatigue. The mean Dialysis Patient-Perceived Exercise Benefits and Barriers Scale score of the patients was 61.8 $\pm$ 14, and the most stated that the perception of exercise benefit was improving appetite and perception of exercise barrier was fatigue. In the study, there was a moderately significant positive correlation between Dialysis Symptom Index and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale ($P \leq .01$). Moreover, 21.3% of the patients' Dialysis Patient-Perceived Exercise Benefits and Barriers Scale scores are explained by Dialysis Symptom Index.
Conclusion: It was found that the dialysis-related symptoms of the hemodialysis patients included in the study were frequent and the effects were intense. Most of them did not exercise regularly, and their positive perception of exercise was moderate.
Keywords: Dialysis symptoms, exercise benefits, exercise barriers, hemodialysis

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INTRODUCTION

Chronic kidney disease (CKD) is a disease with high morbidity and mortality rates.[1] Globally, 1.2 million people died from CKD in 2017 and 697.5 million cases of all-stage CKD were recorded, with a global prevalence of 9.1%.[2] In order for patients with end-stage kidney failure to survive, dialysis or kidney transplantation treatments called kidney replacement therapy should be applied.[3] According to the United States Renal Data System 2020 Annual Data Report, it was reported that 71% of patients with end-stage kidney disease received on dialysis and 29% received kidney transplantation.[1] According to the data of the Turkish Society of Nephrology and the Ministry of Health, as of the end of 2019, it was reported that 83 783 patients have received kidney replacement therapy (KRT), and it was also stated that hemodialysis (73.21%) was the most commonly used treatment method.[4] In most countries, the most common KRT is dialysis and the most widely used is hemodialysis.[5]

Hemodialysis patients develop many psychological problems such as anxiety and depression and physical symptoms such as fatigue, insomnia, nausea, vomiting, muscle cramps, bone and joint pain, and pruritus

related to CKD and its treatment.[6-8] These symptoms experienced in hemodialysis affect individuals in many ways and may adversely affect the exercise behavior of individuals. In the study of Jhamb et al.[9] which they conducted with dialysis patients and those working in the dialysis unit, the most reported obstacles related to exercise were dialysis-related fatigue, comorbid diseases, and lack of motivation. In the study of Lou et al.[10] the relationship between increased somatic symptoms and decreased physical activity was shown.

It has been reported that the decrease in the level of physical activity in hemodialysis patients brings with it many problems, causing atrophy in the muscles and a decrease in capillary density, resulting in a decrease in muscle strength.[11] It was determined that doing exercise increases both physiological and psychological well-being and improves the quality of life.[12,13] In meta-analysis studies, aerobic exercises performed during hemodialysis improved aerobic capacity and physical condition, reduced fatigue and anxiety, improved muscle capillary and resting blood pressure, extended exercise duration, and improved urea clearance;[14] moreover, it was reported that it cures dialysis-related symptoms such as restless legs syndrome, symptoms of depression, muscle cramping, and fatigue.[15] Although exercise is so important in managing symptoms, increasing well-being, and improving quality of life in hemodialysis patients, most of them have a sedentary lifestyle.[16,17] At this point, it is important for health personnel to take initiative to support exercise behaviors in hemodialysis patients. The findings of the study will provide data for the holistic evaluation of the patients and the planning to be made for the development of exercise behaviors. This research was conducted descriptively and relationally to determine the effect of dialysis symptoms on exercise perception in hemodialysis patients.

This study sought answers to the following questions.

1. What are the dialysis symptom levels of patients receiving hemodialysis treatment?
2. What are the barriers and benefits of perception levels of patients receiving hemodialysis treatment for exercise?
3. What is the relationship between dialysis symptom levels and exercise benefits/barriers scale in patients receiving hemodialysis treatment?
4. What is the effect of symptoms on exercise perception in patients receiving hemodialysis treatment?

MAIN POINTS

- Dialysis-related symptoms of the hemodialysis patients included in the study were frequent, the effects were intense, and the most severe symptom was fatigue.
- The majority of the patients receiving hemodialysis did not exercise regularly and did not have a positive perception about the effect of exercise on mental well-being.
- Patients receiving hemodialysis who exercised regularly had fewer symptoms.
- The findings of the study will provide data for the holistic evaluation of the patients and the planning to be made for the development of exercise behaviors.

METHODS

Research Design

This research was conducted descriptively and relationally to determine the effect of dialysis symptoms on exercise perception in hemodialysis patients.

Study Population and Sample

The population of the study consisted of patients who presented to one University Health Application and Research Center in Central Anatolia, Organ Transplantation and Dialysis Hospital Nephrology outpatient clinics. G-Power program was used to calculate the sample. The sample of the study was determined as 116 people, with 95% confidence (1 - α), 95% test power (1 - β), d = 0.3 effect size for the Dialysis Symptom Index (DSI), in line with the literature.[18] The sample of the study consisted of 120 people who met the criteria for inclusion in the study. As a result of the study, the power of the test was obtained as 94%.

Participant

Individuals who are conscious, who have the cognitive competence to answer the survey questions, who can communicate verbally, who can carry out activities of daily living independently, who continue the chronic hemodialysis session, who agree to participate in the research, and who have started hemodialysis at least 3 months ago were included in the research. The data of the study were collected face to face between April 15 and September 1, 2021. Considering the possibility of being missing, a total of 165 people were invited to the study by taking 40% more samples. Among these individuals, 130 of them agreed to participate in the study. Two patients were excluded from the study because they left the questionnaire questions unfinished, 3 patients could not answer the questions due to the change in their clinical status, and 5 patients gave incomplete or contradictory answers to the questionnaire and scale questions.

Data Collection Tools

The data of the study were collected by using a questionnaire form, DSI, and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale (DPEBBS) to determine some sociodemographic and disease-related characteristics of hemodialysis patients.

Questionnaire Form

The questionnaire was created to determine some sociodemographic characteristics of hemodialysis patients such as age, gender, educational status, occupation, and characteristics related to hemodialysis treatment and exercise status.[6,9-11]

Dialysis Symptom Index

Dialysis Symptom Index was developed by Weisbord et al to measure the level of stress experienced in hemodialysis patients related to the symptoms. The scale developed from The Memorial Symptom Assessment Scale—Short Form consists of 30 items. Answers are obtained with a 5-point Likert scale. The symptoms experienced in the last 7 days are answered as yes or no, and if yes, the effects of the symptoms are evaluated as 0 = not at all, 1 = a little, 2 = sometimes, 3 = very little, and 4 = too much. The total scale score is calculated by summing the obtained scores. Scale score ranges from 0 to 150. A value of 0 indicates that there is no symptom. The increase in the total scores of the answers up to 150 points indicates that the effect of the mentioned symptom increased.[19] The Turkish validity and reliability of the DSI were made by Önsöz and Yeşilbalkan (2007).[20] The internal consistency coefficient of the scale was determined as 0.84. In the present study, Cronbach alpha coefficient of the scale was determined as 0.84.

Dialysis Patient-Perceived Exercise Benefits and Barriers Scale

Dialysis Patient-Perceived Exercise Benefits and Barriers Scale was developed by Zheng et al.[21] The Turkish validity reliability was made by Taş and Akyol.[22] The scale consists of 24 items, 2 open-ended questions and 6 sub-dimensions. While 12 of the 24 items (1, 2, 3, 4, 6, 7, 10, 13, 16, 20, 22, and 23) of the scale consisted of statements about the benefits of exercise, the other 12 (5, 8, 9, 11, 12, 14, 15, 17-19, 21, and 24) are also composed of statements that prevent exercise. Negative items are coded in reverse. The scale is a 4-point Likert-type scale, with the lowest score being 24 and the highest possible score being 96. Higher scores indicate a perception of greater exercise benefits and fewer exercise barriers. In Taş and Akyol's study (2019),[22] the total Cronbach Alpha value of the scale was 0.80 and it was found to be 0.90 in our study.

Data Collection Forms

The data were collected by the researchers by face-to-face interview technique. The patients who applied to the outpatient clinic were interviewed in a room reserved for this interview, the purpose of the study was explained and questionnaires were given to the participants who accepted, and the individuals filled the forms themselves. During the answering period, the researchers were with the individuals and answered the questions asked about the forms. It took about 10 minutes to fill out the forms.

Evaluation of Data

The data were evaluated in the IBM Statistical Package for Social Sciences program version 21. Summary statistics of the variables are given as a number of units (n), percentage (%), mean ($\bar{x}$), median, and standard deviation (SD). In the evaluation, the Kolmogorov–Smirnov test was used for compliance with normal distribution, and it was determined that the data were not normally distributed. For this reason, the Mann–Whitney *U*-test was applied for binary variables, and Kruskal–Wallis one-way analysis of variance was applied for 3 or more variables. Spearman's rank correlation coefficient was used for correlation between variables. The relational status between the variables was tested with simple linear regression analysis and $P < .05$ was considered statistically significant in comparisons.

Ethical Disclosures

Approval (2021/264) from the University Clinical Research Ethics Committee and institutional permission from Organ Transplantation and Dialysis Hospital were obtained to conduct the study. Written and verbal consent were obtained from the participants before data were collected.

RESULTS

The comparison of the DSI and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale mean scores according to their descriptive characteristics is given in Table 1. Among the hemodialysis patients participating in our study, 51.7% of them were male, the mean age was 52.2 ± 15.1, the mean time of diagnosis was 112.1 ± 89.3 months, and the mean duration of hemodialysis was 55.9 ± 64 months. Moreover, 49.2% of the participants were primary school graduates, 38.3% were housewives, and 85% had a chronic disease in addition to end stage kidney disease (ESKD). Furthermore, 29.2% of the patients stated that they exercised regularly, 13.3% of them received training/advice from the health personnel about exercising, and 80% of them stated that dialysis treatment reduced their exercise status. In the study, the median DSI score of those who are literate and high school graduates, housewives, those with a chronic disease other than CKD, those who do not exercise regularly, and those who do not receive training/advice from health personnel for exercise were statistically significantly higher than the other groups ($P < .05$). The median DPEBBS score of men, illiterate people, high school and college graduates, housewives, those with a chronic disease other than CKD, those who do not exercise regularly, those who do not receive training/advice from health personnel for exercise, and those whose dialysis treatment reduces their exercise status were statistically significant compared to other groups ($P < .05$).

Table 2 includes the DSI score averages. It was found that 96.7% of the participants felt tired or decreased in energy, 91.7% felt uncomfortable, 90.8% were worried, 90% had shortness of breath, 88.9% felt sad, and 88.9% felt anxious. When the mean scores of the effects of the symptoms of the patients were examined, feeling tired and decrease in energy was 4.55 ± 1.06, worrying was 4.20 ± 1.53, feeling uncomfortable was 4.18 ± 1.47, and feeling anxious was 4.10 ± 1.65.

According to Table 3, when the mean score of the items of perception of exercise barriers is examined, it is 3.82 ± 0.55 for frequent fatigue, 3.79 ± 0.48 for frequent lower extremity muscle fatigue, 3.41 ± 0.79 for body pain, 3.32 ± 0.97 for worrying about the effect of arteriovenous fistula, and 3.11 ± 1.08 for worrying

Table 1. Comparison of Hemodialysis Patients "Dialysis Symptom Index and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale in Dialysis Patients" Mean Scores According to Their Descriptive Characteristics (n = 120)

Descriptive Characteristics	n	%	DSI Median (min-max)	DPEBBS Median (min-max)
Gender				
Male	62	51.7	81.5 (29-119)	65.5 (38-89)
Female	58	48.3	73.5 (5-119)	56 (29-91)
Test first			1571.500*	1180.000*
P			.234	.001
Age (year) (mean ± SD)			52.2 ± 15.1	
Age (year) (mean ± SD)			52.2 ± 15.1	
Time of diagnosis (months) (mean ± SD)			112.1 ± 89.3	
Duration of hemodialysis (months) (mean ± SD)			55.9 ± 64	
Education status				
Illiterate	11	9.2	69 (59-115)[ab]	67 (54-86)[c]
Literate	7	5.8	93 (85-119)[b]	74 (58-86)[ac]
Primary school	59	49.2	84 (5-119)[ab]	63 (29-91)[ac]
Middle school	9	7.5	81 (61-113)[ab]	62 (48-77)[ac]
High school	25	20.8	68 (23-111)[a]	54 (36-80)[ab]
University	9	7.5	72 (56-97)[ab]	51 (41-70)[ab]
Test first			15.844**	18.126**
P			.007	.003
Profession				
Housewives	46	38.3	81.5 (29-119)[a]	67 (38-89)[a]
Retired	44	36.7	84 (5-113)[a]	59.5 (29-91)[a]
Unemployment	23	19.2	76 (23-119)[ab]	59 (40-80)ab
Other (official, former)	7	5.8	54 (45-72)[b]	42 (36-56)[b]
Test first			7.743**	9.344**
P			.041	<.001
Having any chronic disease other than ESKD				
Yes	102	85	81.5 (5-119)	63 (29-91)
No	18	15	70.5 (23-113)	53 (40-77)
Test first			625.000*	588.000*
P			0.031	0.015
Regular exercise status				
Yes	35	29.2	70 (23-115)	52 (29-73)
No	85	70.8	84 (5-119)	66 (38-91)
Test first			991.000*	527.000*
P			.004	<.001
Having received training from health personnel about exercising				
Yes	16	13.3	61 (37-113)	49.5 (29-76)
No	104	86.7	81 (5-119)	63 (33-91)
Test first			569.500*	421.500*
P			.043	.002

(*Continued*)

Table 1. Comparison of Hemodialysis Patients "Dialysis Symptom Index and Dialysis Patient-Perceived Exercise Benefits and Barriers Scale in Dialysis Patients" Mean Scores According to Their Descriptive Characteristics (n = 120) (*Continued*)

Descriptive Characteristics	n	%	DSI Median (min-max)	DPEBBS Median (min-max)
How dialysis treatment affected exercise status				
Increased	1	0.8	95 (95-95)	43 (43-43)
Reduced	96	80	81.5 (5-119)	63 (29-91)
Did not change	23	19.2	71 (23-101)	56 (36-87)
Test first			3.704**	7.331**
P			.157	.026
Seeing benefits from exercise (n = 35)***				n (%)
It makes the body stay fit				16 (13.3)
Improves mood				20 (16.7)
Other (improving movement, improving shortness of breath)				9 (7.5)
Reason not exercise (n = 85)***				
General fatigue				73 (60.8)
Absence of habit				27 (22.5)
COVID-19 pandemic				24 (19.2)
Knee pain				12 (10)
Difficulty walking				6 (5)
Other (dialysis and dialysis-related symptoms, herniated disc, overweight, winter season, old age, fear of falling)				19 (15.2)

DPEBBS, Dialysis Patient-Perceived Exercise Benefits and Barriers Scale; DSI, Dialysis Symptom Index; SD, standard deviation.
[a–c]No difference between groups with the same letter for each measurement (Dunn test), *Mann–Whitney *U*-test, **Kruskal–Wallis one-way analysis of variance, median (min-max), ****Multiple response.

about falling during exercise. When the average score of the participant's perception of exercise benefits is examined, it is 2.42 ± 1.15 to improve appetite, 2.22 ± 1.15 to protect against other diseases, 2.16 ± 1.10 to increase the quality of life, 2.15 ± 1.15 to improve bone diseases, and 2.13 ± 1.09 to reduce body pain. Moreover, in the case of seeing the benefits of exercise, 16.7% of participants stated that exercise improves their mood, while 60.8% stated that they could not exercise due to general fatigue.

The DSI of the patients, the mean, SD, and Spearman's correlation values of the DPEBBS are given in Table 4. In our study, it was seen that the mean DSI score of hemodialysis patients was 77 ± 23.5, and the total mean score of DPEBBS was 61.8 ± 14. It was determined that there was a statistically significant and positive correlation between DSI and DPEBB total score average ($r = 0.444$; $P < .05$).

The effect of the DSI on Exercise Benefits/Barriers in Dialysis patients is given in Table 5. There was a statistically significant effect of dialysis symptoms on exercise benefits/barriers in dialysis patients ($P < .001$). When there is a 1-unit increase in DSI, there will be an increase of 0.274 in DPEBBS. Besides, 21.3% of the patients' DPEBBS scores are explained by DSI.

DISCUSSION

In this study, which was conducted to determine the effect of dialysis symptoms on exercise perception in hemodialysis patients, DPEBBS was found to be 61.76 ± 13.97 and DSI was 76.98 ± 23.53. Considering that the lowest score that can be obtained from DPEBBS was 24 and the highest score was 96, it can be stated that their perceptions of the benefits of exercise were at a moderate level. When the studies related to the subject were examined, the mean DPEBBS score was found to be 68.2 ± 7.4 in the study of Ghafourifard et al.[23] and 82.9 ± 9.1 in the study of Tas and Akyol[22] that is about Turkish validity and reliability of the scale. The positive perceptions of the participants in these studies were found to be higher than our results, and this difference is thought to be due to the presence of the COVID-19 pandemic at the time of the data collection. Fear of getting an infection during the pandemic process, quarantine, and lockdown can cause mental and physical fatigue in hemodialysis patients, who are in a risky group and increase the perception of barriers to exercise. The effect of psychological symptoms such as worry, feeling anxious, and sad was found to be high in the patients included in the study. Furthermore, in our study, the majority of the participants (86.7%) reported that they did not receive training or advice from health personnel about exercising. It is thought

Table 2. Dialysis Symptom Index Score

Symptoms	No Symptoms n (%)	Present n (%)	Mean ± SD
Constipation	47 (39.2)	73 (60.8)	2.69 ± 2.28
Nausea	61 (50.8)	59 (49.2)	1.79 ± 1.98
Vomiting	95 (79.2)	25 (20.8)	0.79 ± 1.61
Diarrhea	107 (89.2)	13 (10.8)	0.38 ± 1.14
Decreased appetite	51 (42.5)	69 (57.5)	2.30 ± 2.14
Muscle cramps	28 (23.3)	92 (76.7)	3.05 ± 1.90
Swelling in legs	80 (66.7)	40 (33.3)	1.19 ± 1.86
Shortness of breath	12 (10.0)	108 (90.0)	3.70 ± 1.64
Lightheadedness or dizziness	33 (27.5)	87 (72.5)	2.58 ± 1.79
Restless legs or difficulty keeping legs still	85 (70.8)	35 (29.2)	0.96 ± 1.66
Numbness or tingling in feet	42 (35.0)	78 (65.0)	2.52 ± 2.08
Feeling tired or lack of energy	4 (3.3)	116 (96.7)	4.55 ± 1.06
Cough	70 (58.3)	50 (41.7)	1.46 ± 1.87
Dry mouth	35 (29.2)	85 (70.8)	2.96 ± 2.11
Bone or joint pain N	47 (39.2)	73 (60.8)	2.49 ± 2.17
Chest pain	92 (76.7)	28 (23.3)	0.85 ± 1.61
Headache	36 (30.0)	84 (70.0)	2.75 ± 2.00
Muscle soreness	79 (65.8)	41 (34.2)	1.33 ± 1.95
Difficulty concentrating	103 (85.8)	17 (14.2)	0.60 ± 1.52
Dry skin	28 (23.3)	92 (76.7)	3.00 ± 1.88
Itching	50 (41.7)	70 (58.3)	2.20 ± 2.06
Worrying	11 (9.2)	109 (90.8)	4.20 ± 1.53
Feeling nervous	24 (20.0)	96 (80.0)	3.22 ± 1.91
Trouble falling asleep	33 (27.5)	87 (72.5)	3.38 ± 2.17
Trouble staying asleep	41 (34.2)	79 (65.8)	3.05 ± 2.29
Feeling irritable	10 (8.3)	110 (91.7)	4.18 ± 1.47
Feeling sad	14 (11.7)	106 (88.9)	3.84 ± 1.66
Feeling anxious	14 (11.7)	106 (88.9)	4.10 ± 1.65
Decreased interest in sex	28 (23.3)	92 (76.7)	3.49 ± 2.13
Difficulty becoming sexually aroused	32 (26.7)	88 (73.3)	3.38 ± 2.20

SD, standard deviation.

Table 3. Dialysis Patient-Perceived Exercise Benefits and Barriers Scale

Items	X ± SD
Q1. Exercise helps reduce my total medical costs.	1.90 ± 0.99
Q2. Exercise helps reduce my body pain.	2.13 ± 1.09
Q3. Exercise can postpone a decline in body function.	2.07 ± 1.03
Q4. Exercise prevents muscular wasting.	1.99 ± 1.04
Q5. Frequent tiredness impedes my exercise participation.	3.82 ± 0.55
Q6. Exercise improves my mood.	1.76 ± 0.97
Q7. Exercise improves bone disease.	2.15 ± 1.15
Q8. Exercise is adverse to health of dialysis patients.	2.91 ± 1.24
Q9. I worry about a fall during exercise.	3.11 ± 1.08
Q10. Exercise improves my appetite.	2.42 ± 1.15
Q11. Frequent lower-extremity muscle fatigue impedes my exercise	3.79 ± 0.48
Q12. I lack an understanding of the benefits of exercise.	2.47 ± 1.28
Q13. Exercise helps me to lead an optimistic and active life.	1.82 ± 0.90
Q14. Exercise is not suitable for me since I have other medical conditions.	2.93 ± 1.17
Q15. Body pain impedes my exercise participation.	3.41 ± 0.79
Q16. Exercise improves my quality of life.	2.16 ± 1.10
Q17. I lack an understanding of the knowledge on how to carry out exercise.	2.76 ± 1.19
Q18. I worry that exercise may make me feel thirsty.	3.05 ± 1.16
Q19. Exercise is not suitable for me since I have kidney disease	3.09 ± 1.18
Q20. Exercise can keep my body weight at a steady level.	1.86 ± 0.88
Q21. I worry that exercise may affect my arteriovenous fistula.	3.32 ± 0.97
Q22. Exercise helps enhance my self-care abilities.	2.13 ± 1.02
Q23. Exercise will keep me free from having other diseases (e.g., cold).	2.22 ± 1.10
Q24. Outdoor exercise adds burden to my family (since I need their company while I am out).	2.51 ± 1.19

SD, standard deviation.

that both conditions negatively affect the exercise perceptions of the dialysis patients included in the study. To develop a positive perception toward exercise, it is necessary to provide counseling for exercise and to make special plans that support exercise during the pandemic process.

In studies related to the subject, it is mentioned that dialysis patients have positive perceptions about exercise.[24,25] In a qualitative study conducted by Jhamb et al.[9] the majority of the participants mentioned that exercise was beneficial to their

Table 4. Relationship Between Dialysis Symptom Index and Exercise Benefits/Barriers Scale in Dialysis Patients

Variables	Mean ± SD	1	2
1. DSI	77 ± 23.5	–	
2. DPEBBS	61.8 ± 14	0.444**	–

DPEBBS, Dialysis Patient-Perceived Exercise Benefits and Barriers Scale; DSI, Dialysis Symptom Index; SD, standard deviation.
Spearman's correlation coefficient was used.
**$P < .01$.

general health status. In the study of Darawad and Khalil,[26] the perception of benefits of exercise was found to be higher than the perception of obstacles. The increase in the positive perceptions of hemodialysis patients toward exercise increases their health-related quality of life.[23]

In our study, the most frequently expressed positive perception toward exercise was reported as improving appetite, protective effect against other diseases, and improving quality of life. The benefit of exercise, which was mostly overlooked by the patients who did not exercise in our study, is the mood-improving effect of exercise. Parallel to this finding, in this study, psychological symptoms such as worry, discomfort, sadness, anxiety, and nervousness were observed intensely in patients. On the other hand, a small portion of the hemodialysis patients included in the study does regular exercise and the effect that the individuals who exercise reported that the most benefit from exercise is the improvement in their mood. Similar to our study findings, in the study by Jhamb et al.[9], it was found that although the majority of patients were aware of the effects of exercise on general health, their positive perceptions related to its positive effect on mental health were insufficient. The positive effect of exercise on mental health in patients with ESKD is known, and in a systematic review and meta-analysis study conducted on the subject, it has been reported that exercise has a positive effect on anxiety and depression in patients with ESKD.[27] At this point, healthcare professionals should provide necessary training on the importance of exercise in ensuring and maintaining the psychological well-being of hemodialysis patients and encourage them to do regular exercise by evaluating the patients in a holistic way and determining the most appropriate exercises for the individual.

Table 5. Effect of Dialysis Symptom Index on Exercise Benefits/Barriers in Dialysis Patients

	β^1 (95% CI)	β^2	t	P
Constant	40.661 (32.937-48.385)		10.424	**<.001**
DSI	0.274 (0.178-0.370)	0.462	5.654	**<.001**

$F = 31.964$; $P < .001$; $R^2 = 0.213$; SE of estimate = 12.441.
DPEBBS, Dialysis Patient-Perceived Exercise Benefits and Barriers Scale; DSI, Dialysis Symptom Index; SE, standard error.
β^1, unstandardized coefficient; β^2, standardized coefficient; Durbin–Watson = 1.762.

In the study of Jayaseelan et al.[24] it was determined that positive perceptions of exercise increased psychological well-being and quality of life, prevented muscle loss and bone diseases, kept body weight constant, and increased self-care activities in the majority of participants. In the study of Moorman et al.[28] participants stated that exercise increases energy and strength the most as a benefit.

The symptom diversity and frequency of hemodialysis patients participating in our study were found to be high. The most common symptoms were fatigue and decreased energy. The most frequently reported patient-perceived barrier to exercise was low energy levels and fatigue in kidney diseases.[29] In our study, the majority of our participants reported that they could not exercise due to fatigue. In studies on the subject, it is emphasized that fatigue is the biggest obstacle to exercise.[9,25,26,28] Effective management of fatigue in dialysis patients can remove the biggest obstacle for individuals to exercise and create an opportunity for them to exercise.

Other barriers that the patients expressed intensely in our study were frequent lower-extremity muscle fatigue, body pain, worry about the effect of arteriovenous fistula, and fear of falling. Similar to our findings, other obstacles besides fatigue are body pain,[25] lower-extremity fatigue,[26] fear of falling,[24,25] and vascular access.[24] Lack of knowledge about exercise,[24,25] comorbid conditions and loss of motivation,[9] shortness of breath and weakness,[28] treatment side effects, and family burden[24] are other common exercise barriers. In our study, it was found that the DSI score average of individuals who exercise regularly was statistically significantly lower. This may be related to the fact that exercise has a positive effect on symptoms or that those with less severe symptoms can do exercise comfortably. It was found that the increase in DSI score was effective on the individuals' perception of exercise benefits. It is thought that as individuals experience intense symptoms, they have a positive perception of the benefits of exercise, but the increase in symptom severity prevents them from exercising. As a matter of fact, the majority of our participants reported that they did not exercise due to fatigue, which is a serious symptom. Encouraging patients to exercise by motivating them to exercise is also very effective in symptom management. Some studies have shown that aerobic exercises have a positive effect on many hemodialysis-related symptoms such as fatigue, restless legs syndrome, depression and muscle cramps in dialysis patients, and intradialytic resistance exercises have a positive effect on physical performance.[15,30]

As a result, it was determined that the majority of the hemodialysis patients within the scope of the study did not exercise regularly and had a lower positive perception toward exercise compared to the findings of other studies related to the subject. Moreover, it was determined that the perception of exercise benefits was mostly improved appetite, protective effect against other diseases, and improved quality of life. The majority of the

participants do not have a positive perception about the effect of exercise on mental well-being.

Strength and Limitations

The strength of our research is that it is the first study to determine the effect of symptoms on the perception of exercise barrier and benefit in hemodialysis patients as a result of the literature review. The sample of this study is limited to patients from a single center. The other limitations of the study are the collection of data during the COVID-19 pandemic and the self-reports of the answers given by the individuals participating in the research to the scales.

In our study, it was found that dialysis-related symptoms were severe and intense, the most severe symptom was fatigue, patients who exercised regularly had fewer symptoms, and as the symptoms of the patients increased, their positive perception of exercise increased. It is recommended to plan interventional studies that will allow effective management of symptoms in hemodialysis patients and affect the perception of exercise positively.

Ethics Committee Approval: Approval (2021/264) from the Erciyes University Clinical Research Ethics Committee and institutional permission from Semiha Kibar Organ Transplantation and Dialysis Hospital were obtained to conduct the study.

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – Z.K., N.U.; Design – Z.K.; Supervision – N.U.; Materials – Z.K., N.U; Data Collection and/or Processing – N.U.; Analysis and/or Interpretation – N.U., Z.K.; Literature Review – Z.K.; Writing – Z.K.; Critical Review – N.U., ZK.

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