e-ISSN:2687-2145

BANDIRMA ONYEDİ EYLÜL ÜNİVERSİTESİ SAĞLIK BİLİMLERİ VE ARAŞTIRMALARI DERGİSİ
BANU Journal of Health Science and Research

DOI: 10.46413/boneyusbad.1439000 ***Özgün Araştırma / Original Research***

Postdialysis Fatigue and Comfort Levels of Patients Receiving Hemodialysis Treatment

Hemodiyaliz Tedavisi Gören Hastaların Diyaliz Sonrası Yorgunluk ve Konfor Düzeyleri

Özlem ÖZDEMİR [1]

[1] *Assistant Professor, Kirklareli University, Faculty of Health Sciences, Department of Nursing, Kirklareli / Türkiye*

Sorumlu yazar / Corresponding author

Özlem ÖZDEMİR

ozlem.ozdemir@klu.edu.tr

Geliş tarihi / Date of receipt: *17.02.2024*

Kabul tarihi / Date of acceptance: *24.06.2024*

Atıf / Citation: Özdemir, Ö. (2024). Postdialysis fatigue and comfort levels of patients receiving hemodialysis treatment. *BANÜ Sağlık Bilimleri ve Araştırmaları Dergisi*, *6*(2), 356-365. doi: 10.46413/boneyusbad.1439000

ABSTRACT

Aim: *In this study aimed to determine postdialysis fatigue and comfort levels in patients receiving hemodialysis treatment and the factors affecting them.*

Material and Method*: The study is a descriptive and cross-sectional research. It was completed with 112 patients receiving regular hemodialysis treatment. Patient Evaluation Form, Postdialysis Fatigue Scale and Hemodialysis Comfort Scale were used to collect data.*

Results: *The mean score of the Postdialysis Fatigue Scale was 35.73 ± 11.80. The mean score of the Hemodialysis Comfort Scale was 24.57 ± 8.91. There was a negative correlation between the Postdialysis Fatigue Scale score and the Hemodialysis Comfort Scale score of the patients (r=-0.558, p=0.000). The results of the multiple regression analysis were significant predictors of the presence of complaints between two dialysis, postdialysis blood pressure levels and postdialysis fatigue level of comfort levels (p<0.05).*

Conclusion: *Postdialysis fatigue and comfort level were above average. Postdialysis fatigue negatively affects the comfort of patients. While the presence of symptoms in patients between two dialysis sessions decreased comfort, the decrease in blood pressure after dialysis increased the comfort level. Postdialysis fatigue and comfort should be routinely evaluated in patients receiving hemodialysis treatment by nurses. Postdialysis fatigue should not be underestimated.*

Keywords: *Hemodialysis, Comfort, Postdialysis Fatigue*

ÖZET

Amaç: *Bu çalışmada, hemodiyaliz tedavisi gören hastaların diyaliz sonrası yorgunluk ve konfor düzeyleri ve bunları etkileyen faktörleri belirlemek amaçlandı.*

Gereç ve Yöntem: *Çalışma tanımlayıcı ve kesitsel bir araştırmadır. Çalışma, düzenli hemodiyaliz tedavisi gören 112 hasta ile tamamlandı. Verilerin toplanmasında Hasta Değerlendirme Formu, Diyaliz Sonrası Yorgunluk Ölçeği ve Hemodiyaliz Konfor Ölçeği kullanıldı.*

Bulgular: *Diyaliz Sonrası Yorgunluk Ölçeği'nin ortalama puanı 35.73 ± 11.80 idi. Hemodiyaliz Konfor Ölçeği ortalama puanı 24.57 ± 8.91 idi. Hastaların diyaliz sonrası yorgunluk ölçeği puanı ile Hemodiyaliz Konfor Ölçeği puanı arasında negatif bir ilişki vardı (r=-0.558, p=0.000). Çoklu regresyon analizi sonuçları, iki diyaliz arasında şikayet varlığı, diyaliz sonrası kan basıncı düzeyi ve diyaliz sonrası yorgunluk düzeyi konforun anlamlı yordayıcısıydı (p< 0.05).*

Sonuç: *Diyaliz sonrası yorgunluk ve konfor düzeyi ortalamanın üzerindeydi. Diyaliz sonrası yorgunluk hastaların konforunu olumsuz etkilemektedir. Hastalarda iki diyaliz seansı arasında semptomların varlığı konforu azaltırken, diyaliz sonrası kan basıncının azalması konfor düzeyini artırdı. Hemodiyaliz tedavisi alan hastalarda diyaliz sonrası yorgunluk ve konfor hemşireler tarafından rutin olarak değerlendirilmelidir. Diyaliz sonrası yorgunluk hafife alınmamalıdır.*

Anahtar Kelimeler*: Hemodiyaliz, Konfor, Diyaliz Sonrası Yorgunluk*

INTRODUCTION

Chronic kidney disease (CKD) is an important health problem with increasing prevalence and incidence all over the world, with high mortality, morbidity and health burden (Provenzano et al., 2019). Hemodialysis is the most commonly used renal replacement therapy among patients with end-stage kidney disease (ESKD). The Turkish Society of Nephrology Registry report (2021), the point prevalence of ESKD requiring kidney replacement therapy in Türkiye was 993.5 per million population. As of the end of 2021 in Türkiye, 70.06% of patients being followed up with kidney replacement therapy receive hemodialysis treatment.

Patients receiving hemodialysis treatment experience many symptoms. These symptoms negatively affect the emotional, psychological, physical, social and mental states of the patients and their daily living activities. These experienced symptoms can lead to a decrease in the quality of life of the patients, deterioration of their comfort and an increase in the death rate of the patients (Dikmen & Aslan, 2020).

When the symptoms seen in patients receiving hemodialysis treatment are examined, it is seen that fatigue is among the most common symptoms (Dikmen & Aslan, 2020). Hemodialysis patients experience fatigue due to many reasons that are not fully explained (Dubin et al., 2013). Postdialysis fatigue (PDF) is one of the causes of fatigue after dialysis treatment. PDF defined as feeling tired after a dialysis session and needing rest or sleep. And it is a very distressing symptom. In short, fatigue after dialysis is defined as tiredness, weakness, exhaustion, weariness or fatigue. After hemodialysis treatment, many patients report feeling tired and needing rest or sleep (Bossola et al., 2011; Bossola & Tazza, 2016). PDF negatively affects the daily activities of hemodialysis patients and causes a decrease in the quality of life (Bossola & Tazza, 2016). And it is a debilitating and common symptom in hemodialysis patients (Bossola et al., 2011). It is seen in the literature that the incidence of PDF varies between 50.5% and 85% (Bossola & Tazza, 2016; Bossola et al., 2021). It was reported that 20% of patients receiving hemodialysis treatment experienced severe PDF, and it was associated with depression (Dubin et al., 2013). Hemodialysis patients, who live most of their lives connected to hemodialysis machines, face different physical and emotional problems (Tabiee et al., 2017). Comfort gains a special importance in these patients and many symptoms they experience negatively affect the comfort level of patients (Özer & Alkın Demir, 2022; Tabiee et al., 2017). Kolcaba explained the definition of comfort as follows; ‘providing peace of mind regarding the needs of the individual andphysical, related to coping with problems, psychospiritual, social and environmental integrity An expected structure with a complex structureis the result’. Kolcaba stated that nurses can benefit from comfort theory as a guide in meeting the comfort needs of patients during the nursing care process. (Kolcaba, 1994). Ensuring the patient's comfort forms the basis of nursing care. Nurses have a key role in ensuring patient comfort. And, it is a positive outcome of nursing care interventions (Tabiee et al., 2017). In a recent research, reported that symptoms experienced due to dialysis affected patient comfort by as high as 21.5% (Dikmen & Aslan, 2020). It is very important to know the comfort levels of patients in planning patient education and in the implementation of nursing interventions and symptom management (Kacaroğlu Vicdan, 2020). Hemodialysis nurses have an important role in increasing the comfort of patients receiving hemodialysis treatment (Borzou, Anosheh, Mohammad & Kazemnejad, 2014; Kacaroğlu Vicdan, 2020). The primary goal of patient care is comfort and is central to the patient experience. The universal goal of health services is to maximize the comfort level (Boudiab & Kolcaba, 2015).

It appears that there is limited research on PDF (Bossola et al., 2021; Bossola & Tazza, 2016) and comfort levels in the literatüre (Bilgiç & Pamuk Cebeci, 2022; Dikmen & Aslan, 2020; Melo et al., 2019; Özer & Alkın Demir, 2022; Santos et al., 2020). The relationship and effect of PDF with comfort has not been found in the literature. We believe that this study will fill this gap.

Research Questions

The research questions were presented bellow;

1. What is the PDF level of the patients receiving hemodialysis treatment?

2. What is the comfort level of the patients receiving hemodialysis treatment?

3. Is there a relationship between some characteristics of patients receiving hemodialysis treatment and PDF and comfort level?

4. What are the factors affecting the PDF and

comfort level of the patients receiving hemodialysis treatment?

MATERIALS AND METHODS

Research Type

The type of this research was a descriptive and cross-sectional study.

Study Population and Sample

The universe of the research; between January 22 and July 20, 2023, a total of 152 patients received hemodialysis treatment in one private and two public dialysis centers in a province located in the Thrace region of western Türkiye. Sample selection method was not used in this study. The sample of the study included all patients who volunteered to participate and met the inclusion criteria. It was calculated that at least 110 hemodialysis patients should be included in the calculation made by taking 5% margin of error and 95% confidence interval in the computer environment in determining the sample size. The study was participated with 112 patients.

All patients were on standard bicarbonate hemodialysis treatment for 4 hours. Patients who were 18 years of age or older, had CKD, and who had hemodialysis treatment for at least 6 months in the study were included in the study. It was essential that patients volunteered to participate in the study. Patients who were receiving hemodialysis treatment due to acute kidney disease, who were under the age of 18, and who had communication problems (hearing, language, comprehension, etc.) were excluded from the study.

Data Collection Tools

Patient Evaluation Form, Post-Dialysis Fatigue Scale and Hemodialysis Comfort Scale (HDCS) were used to collect patients' data.

Patient Evaluation Form: It was created by the researcher by scanning the literatüre (Bilgiç & Pamuk Cebeci, 2022; Dikmen & Aslan, 2020; Ozen et al., 2021).The form consisted of two parts. In the first part, the patient's socio-demographic and disease characteristics (age, gender, marital status, education, hemodialysis duration, etc.) In the second part, clinical characteristics and patients' follow-ups (hemoglobin, albumin, dialytic agent clearance (KT/V), urea reduction rate (URR), interdialytic weight gain (IDWG), pre and post dialysis blood pressure, ultrafiltration (UF) amount etc.).

Postdialysis Fatigue Scale: The PDF scale was developed by Kodama et al. (2020). And it is is a five-point Likert type scale. It is used to evaluate the severity of fatigue and PDF treatment in dialysis patients. The Turkish validity and reliability was conducted by Ozen et al., (2021). A score between 11 and 55 points is obtained from the scale. An increase in the score indicates that the severity of fatigue increases. The scale has not any cut-off point. Patients are asked to answer each question, taking into account the time between the end of dialysis treatment and bedtime (Kodama et al., 2020; Ozen et al., 2021). The Cronbach's Alpha value of the scale was 0.77 (Ozen et al., 2021). In this study, the Cronbach's Alpha value of the scale was 0.94.

Hemodialysis Comfort Scale: The HDCS was developed by Şahin Orak et al. (2017) based on the "General Comfort Scale". The HDCS is used to determine the comfort of patients who have undergone hemodialysis treatment for at least six months. HDCS is a five-point Likert type measurement tool. The scale consists of 9 items and two subscales. The relief subscale consists of 3 items and the overcoming subscale consists of 6 items. A score of 3-15 is taken from the relief subscale, and 6-30 points are taken from the overcoming subscale, between 9-45 HDCS. As the score obtained from the scale increases, the level of comfort increases. The Cronbach's Alpha value of the scale was 0.87 (Şahin Orak et al., 2017). In this study, the Cronbach's Alpha value of the scale was 0.97.

Data Collection

Data were collected in the dialysis room during the dialysis session when the patient was available. Face-to-face interview technique was used by the researcher. Laboratory results in the data collection form (the last one) were obtained from the patient file. Patients' follow-ups (blood pressure, IDWG, UF, etc.) during the dialysis session were followed up by the hemodialysis nurse and recorded in the patient file. Interdialytic weight was accepted as the difference between the predialysis weight for the current session and the previous postdialysis weight. The amount of UF was calculated by the hemodialysis physician by subtracting the dry weight from the patient weight for each dialysis session. The researcher recorded these data in the patient file on the patient evaluation form after obtaining consent from the patient. The application of these forms was

approximately 20 minutes.

Ethical Consideration

Before the research, written permission was obtained from the ethics committee of Kirklareli Institute of Health Sciences Research Ethics Committee (Date: 20.06.2022, and Approval Number: P4506R0) and relevant institutions. The patients were informed about the purpose of the study. Then, written consent was obtained from the patients. Ethical principles were followed at all stages of the study.

Data Analysis

The analysis of the data obtained from the research is a special Statistical Package for Social on computer Science (SPSS) 15 package program has been carried out. Descriptive statistics (number (n), percentage (%), mean and standard deviation (SD), etc.) were used to evaluate the study data. The data were tested for normal distribution using the Shapiro-Wilk test. In the study t test in independent groups, Pearson correlation analysis and multiple lineer regression analysis was used for statistical analysis. A p-value of lower than $p<0.05$ was performed as statistically significant.

RESULTS

The mean age of the patients was 61.05 ± 10.19 years and the duration of HD entry was 59.68 ± 51.58 months. 57.1% of the patients were male and 84.8% were married. There was an other chronic disease in 46.4% of the patients. The primary CKD etiology of the patients was DM with 53.60%. Between two dialysis sessions, 83% of patients had a symptom. The laboratory results and dialysis session follow-up results of the under hemodialysis patients are shown in Table 1.

The mean PDF scale score of the patients was 35.73 ± 11.80 and 88.4% of patients had PDF. The mean HDCS was 24.57 ± 8.91, relief subscale mean score and the overcoming subscale mean score was 8.13 ± 3.29, 16.45 ± 5.88 respectively.

Table 1. Characteristics of Patients Receiving Hemodialysis Treatment (n=112)

	n	**%**
Gender		
Male	64	57.1
Female	48	42.9
Marital status		
Married	94	84.8
Single	18	15.2
Comorbid disease		
Yes	52	46.4
No	60	53.6
Primer etiology of CKD		
Diabetes mellitus	60	53.6
Hypertension	38	33.9
Other (Glomerulonephritis. SLE etc.)	14	12.5
Symptom		
Yes	93	83.0
No	19	17.0
	Mean ± SD	**Min.–Max.**
Age (year)	61.05 ± 10.19	28-83
HD treatment duration (month)	59.68 ± 51.58	6-244
Hemoglobin (gr/dL)	10.89 ± 1.71	7.40-14.00
Albumine (gr/dL)	3.94 ± 0.59	2.60-4.21
IDWG (ml)	2797.32 ± 1068.60	1000-5800
Ultrafiltration	2690.18 ± 801.01	800-4000
KT/V	2.82 ± 1.84	1.27-2.82
URR (%)	76.07 ± 10.89	62.21-90.86
Predialysis blood pressure (mmHg)	132.45 ± 30.92 / 76.52 ± 14.39	85-212 / 50-110
Postdialysis blood pressure (mmHg)	119.12 ± 25.45 / 71.53 ± 13.41	80-200 / 45-110

Abbreviations: CKD, Chronic kidney disease; HD: hemodialysis; IDWG: Interdialytic weight gain; KT/V: dialytic agent clearance; URR: Urea Reduction Ratio; Mean ± SD: Mean ± Standard Deviation

There was no statistically significant difference between the PDF mean score and, marital status, gender and presence of comorbid disease in patients receiving hemodialysis treatment (p>0.05). There was a statistically significant difference between the marital status, gender and comorbid disease, and HDCS mean score, relief subscale mean score and overcoming subscale mean score (p<0.05). The level of comfort was higher for women, married people, and those who did not have a comorbid disease (Table 2).

Table 2. Some Characteristics of Patients Receiving Hemodialysis Treatment and Distribution of PDF and HDCS Score Averages

	PDF scale	HDCS	Relief subscale	Overcoming subscale
Gender				
Female	35.23 ± 13.28	26.98 ± 9.34	9.13 ± 3.23	17.86 ± 6.36
Male	36.10 ± 10.67	22.77 ± 8.18	7.38 ± 3.16	15.36 ± 5.30
Statistics	t=-0.377	t=2.490	t=2.832	t=2.177
	p=0.707	**p=0.15***	**p=0.05***	**p=0.32***
Marital status				
Married	35.53 ± 11.81	25.68 ± 8.56	8.46 ± 3.29	17.22 ± 5.80
Single	36.88 ± 12.06	18.35 ± 6.42	6.24 ± 2.70	12.12 ± 4.30
Statistics	t=0.653	t=4.066	t=3.020	t=4.250
	p=0.673	**p=0.000***	**p=0.06***	**p=0.001***
Comorbid disease				
Yes	35.05 ± 11.29	27.33 ± 8.48	9.36 ± 2.85	15.12±5.68
No	36.50 ± 12.56	22.18 ± 8.70	7.07 ± 3.32	17.98±5.83
Statistics	t=0.645	t=3.149	t=-3.142	t=-2.608
	p=0.524	**p=0.002***	**p=0.000***	**p=0.010***

Abbreviations:PDF: Postdialysis fatigue; HDCS: Hemodialysis Comfort Scale. ***** Student's t tests. Bold values indicated as p < 0.05

There was a negatively, significant relationship between the PDF scores of patients and HDCS scores (r=-0.558; p=0.000), relief subscale scores (r=-0.464; p=0.000), overcoming subscale scores (r=-0.586; p=0.000), hemoglobin levels (r=-0.427; p=0.000) and KT/V levels (r=-0.291; p=0.002). And There was a positively, significant relationship between the PDF scores of patients between age (r=0.224; p=0.018), IDWG (r=0.290; p=0.002) and UF (r=0.242; p=0.01). There was a positively, significant relationship between the HDCS scores of patients and relief subscale scores (r=0.948; p=0.000), hemoglobin levels (r=0.406; p=0.000). And there was a negatively, significant relationship between the HDCS scores of patients and IDWG (r=-0.199; p=0.036), UF (r=-0.201; p=0.033). The relief subscale scores were positive correlated with the overcoming subscale scores (r=0.876; p=0.000), positive correlated with hemoglobin levels (r=0.398; p=0.000) and negative correlated with postdialysis blood presure values (r=0.194; p=0.04). The overcoming subscale scores were positive correlated with hemoglobin levels (r=0.392; p=0.000), positive correlated with KT/V levels (r=0.202; p=0.033), negative correlated with IDWG (r=-0.226; p=0.017), negative correlated with UF (r=-0.227; p=0.017) (Table 3).

The results of the multiple regression analysis performed with the Enter method were significant predictors of the presence of symptoms between two dialysis sessions. postdialysis blood pressure levels and post dialysis fatigue level of comfort levels (p<0.05). It explained 42.60% of the total variance. The absence of complaints of patients receiving hemodialysis treatment increased the comfort level. The comfort level of the patients increased as the blood pressure at the end of dialysis decreased. As the PDF level of the patients decreased, their comfort level increased. Patient's age, duration of hemodialysis treatment UF, IDWG were not effective on comfort level (p>0.05) (Table 4).

DISCUSSION

Fatigue is one of the uncomfortable symptoms experienced by patients receiving hemodialysis treatment. And fatigue causes patients to decrease their quality of life (Debnath et al., 2021). In a

curent meta-analysis examining the prevalence of PDF in patients receiving hemodialysis the prevalence PDF was reported as 60% (You et al., 2022). In this study, PDF level of the patients receiving hemodialysis treatment was above the average and 88.4% of patients had PDF. In a study, the PDF level was also above average. It was reported that 22.1% of patients experienced moderate and 38.4% severe end-dialysis fatigue (Bossola et al., 2018). PDF was a common symptom in hemodialysis patients. It is obvious that patients receiving hemodialysis treatment experience PDF.

Table 3. The Relationship Between Some Characteristics of Patients Receiving Hemodialysis Treatment and PDF, HDCS Scores

		PDF scale	HDCS	Relief subscale	Overcoming subscale
HDCS	r	-0.558*****			
	p	**0.000**			
Relief subscale	r	-0.464*	0.948*		
	p	**0.000**	**0.000**		
Overcoming subscale	r	-0.586*	0.984*	0.876*	
	p	**0.000**	**0.000**	**0.000**	
Age	r	0.224*	-0.066	-0.038	-0.078
	p	0.018	0.493	0.693	0.413
HD treatment duration	r	0.02	-0.032	0.059	-0.082
	p	0.83	0.734	0.537	.389
Hemoglobin	r	-0.427*	0.406*	0.398*	0.392*
	p	**0.000**	**0.000**	**0.000**	**0.000**
Albumine	r	-0.038	0.059	0.13	0.017
	p	0.692	0.537	0.173	0.862
KT/V	r	-0.291*	0.183	0.135	0.202*
	p	**0.002**	0.053	0.157	**0.033**
URR	r	-0.016	-0.106	-0.113	-0.098
	p	0.865	0.265	0.236	0.305
IDWG	r	0.290**	-0.199*	-0.11	-0.239*
	p	**0.002**	**0.036**	0.246	**0.011**
Ultrafiltration	r	0.242*	-0.201*	-0.141	-0.226*
	p	**0.01**	**0.033**	0.137	**0.017**
Postdialysis blood pressure	r	-0.125	-0.169	-0.194*	-0.147
	p	0.189	0.076	**0.04**	0.123

Abbreviations: PDF: Postdialysis fatigue; HDCS: Hemodialysis Comfort Scale; KT/V: dialytic agent clearance; URR: Urea Reduction; IDWG: Interdialytic weight gain; *Pearson's correlation was used; Bold values indicated as $p < 0.05$

Table 4. Multiple Linear Regression Models on Comfort in Hemodialysis

	Unstandardized Coefficients		95.0% Confidence Interval for B		Standardized Coefficients		
Variables	**B**	**SH**	**Lower**	**Upper**	**Beta**	**t**	**P**
Constant	64.605	13.54	47.110	47.110		4.55	0.000
Age	-0.004	0.069	-0.141	-0.141	-0.005	9.266	0.951
HD treatment duration	-0.024	0.013	-0.50	-0.050	-0.136	-0.062	0.077
Symptom No=0, Yes=1	-7.641	1.918	-11.444	-11.444	-0.323	-1.785	**0.000***
Ultrafiltration	0.000	0.002	-0.003	-0.003	0.034	-3.984	0.833
Postdialysis blood pressure	-0.068	0.027	-0.121	-0.121	-0.196	-0.212	**0.012***
PDF scale	-0.400	0.060	-0.518	-0.518	-0.530	-2.563	**0.000***
IDWG	-0.001	0.001	-0.004	-0.004	-0.144	-6.677	0.383

R = 0.680; R2 =0.453; Adjusted; R2 = 0.426; F:12.785; Durbin Watson = 1.621. *****p <0 .05 values denote significant correlates

In this study, PDF increased as the age of the patients receiving hemodialysis treatment increased. When the literature was reviewed, it was seen that patients who received hemodialysis treatment experienced PDF more in advanced age, in line with our study (Bossola et al., 2015, Bossola et al., 2018; Debnath et al., 2021; Kang & Chae, 2021). Li et al., (2023) reported that age was an independent risk factor for PDF in patients receiving maintenance hemodialysis treatment. In the same study, elderly hemodialysis patients were found to be more likely to experience PDF (Li et al., 2023). It is an expected result that there is a relationship between fatigue at the end of dialysis and advanced age. Presence of comorbid disease in elderly hemodialysis patients may have caused an increase in functional disorder status PDF level. In this study, there was no associated laboratory parameter with PDF except hemoglobin level and KT/V. As the hemoglobin level of the patients receiving hemodialysis treatment decreased, PDF increased. In recent studies evaluating dialysis recovery time and PDF, there was no correlation between hemoglobin level and PDF (Debnath et al., 2021; Elsayed, Zeid, Hamza & Elkholy, 2022). Despite that it is suggested that the hemoglobin level has an effect on the recovery time at the end of dialysis and increasing the hemoglobin level to develoved the quality of life of patients and increase the recovery time (Smokovska, Grozdanovski & Spasovski, 2015). Additionally, an other study reported that hemodialysis patients with anemia were more likely to experience PDF (Li et al., 2023). CKD anemia caused by insufficient erythropoietin production causes fatigue (Zadrazil & Horak, 2015). Patients with anemia may have experienced more PDF. PDF increased as the KT/V of patients receiving hemodialysis treatment decreased. KT/V is one of the kinetic indicators used to evaluate dialysis adequacy (Daugirdas, 1993). And also a recent study reported that hemodialysis patients were more likely to experience PDF due to inadequate dialysis (Li et al., 2023). In previous studies, unlike this study, PDF was not associated with an indicator of dialysis adequacy (Bossola et al., 2018; Debnath et al., 2021; Joshwa et al., 2020). This difference may be due to the different kinetic indicators of the patients. It is also possible for patients with dialysis inadequate to experience PDF. Patients' PDF also increased as IDWG and UF increased in this study. Bossola et al., (2018) reported PDF severity as negatively and weakly

associated with UF rate. One of the factors that cause fatigue in hemodialysis treatment are physiological factors and include sudden fluid changes. As a result of the increase in patients' IDWG, the amount of UF in the dialysis process also increases. This situation causes hemodynamic deterioration in patients during the dialysis session, dialysis-related complications and the experience of PDF (McIntyre et al., 2008). Excess weight gained between two dialysis sessions causes fatigue with an excess of the amount of fluid decoupled during the dialysis session, that is, UF (Zadrazil & Horak, 2015). It is thought that patients who consumed a lot of fluid between two dialysis sessions and required high UF may have experienced PDF more.

When the literature was examined, it was seen that the comfort levels of the patients who under HD treatment were investigated in a limited number and the comfort level was moderate and above moderate (Bilgiç & Pamuk Cebeci, 2022; Dikmen & Aslan, 2020; Tabiee et al., 2017). Ensuring the comfort of patients is the basis of nursing care. In this study conducted with patients the comfort level of the patients was above moderate. Patient comfort is a positive outcome of nursing interventions (Tabiee et al., 2017). Hemodialysis nurses need to know the socio-demographic characteristics that affect the comfort of patients. In this study the comfort level of women and the married was better. In the literature the comfort level of men was higher in contrast to this study (Gülay, Özdemir Eller, Ökdem, Akgün Çıtak, 2020; Melo et al., 2019; Santos et al., 2020). Estridge, Morris, Kolcaba&Winkelman, (2018); reported that women's comfort level was slightly higher than men's. This difference may be due to cultural factors. Being married was a contributing factor for greater comfort in hemodialysis patients in a recent research (Melo et al., 2019). In an other recent qualitative study conducted with patients receiving hemodialysis treatment. The presence of family and friends positively affected comfort (Borzou et al., 2014). Being married may have increased treatment compliance and comfort level by increasing social support.

In this study, PDF and presence of symptoms between two dialysis sessions were independent predictors of comfort. The comfort levels of the patients decreased as the PDF increased. In a current study, the most common symptom experienced by patients was fatigue. In the same study, it was reported that the symptoms experienced by the patients negatively affected the comfort (Dikmen & Aslan, 2020). Symptoms such as fatigue/energy reduction, pruritus, sexual dysfunctions, sleep disorders, pain affect the life routines of patients and disrupt their comfort. The symptoms experienced by the patients continue during and after hemodialysis. These symptoms negatively affect the daily lives of patients, their relationships with their environment and their comfort levels (Estridge et al., 2018). In the current researches, it has been reported that PDF is an important stressor and negatively affects comfort (Bilgiç & Pamuk Cebeci, 2022; Dikmen & Aslan, 2020). We can say that PDF is a symptom that negatively affects the comfort of hemodialysis patients. In addition, postdialysis blood pressure value was an independent predictor of comfort in this study. As the blood pressure value of the patients decreased after dialysis, their comfort level increased. As far as we can see, the effect of blood pressure on comfort has not been investigated. In our study findings, it was observed that as the blood pressure of the patients decreased at the end of dialysis, the patients' relief increased. This result made us think that the patient may have been relieved by the effect of UF on the increase in blood pressure associated with fluid overload in patients receiving hemodialysis treatment, thus increasing the level of comfort.

Limitations

There was some limitations in this study. One of these is that the study is a cross-sectional type research. The results of the study are based on patients' self-report is the other limitation. The results are limited to the population included in the study, and further research on hemodialysis populations is needed. The strength of the study is that it was conducted in a multicenter manner.

CONCLUSION

In this research, it was determined that, PDF and comfort level were above average. As age increased, patients' postdialysis fatigue level also increased. Nurses should be especially careful about PDF in older patients. Also, a relationship was found between the patients' hemoglobin level, KT/V, UF amount and PDF. It was determined that the comfort level of women, those who were married, and those without comorbidities was higher. Hemodialysis nurses should know the factors that increase PDF and negatively affect comfort. In addition, the absence of symptoms between two dialysis sessions of

patients receiving hemodialysis treatment increased the comfort level. It is recommended that patients be questioned about their complaints between two dialysis sessions. And postdialysis blood pressure values affected comfort level. Factors that increase PDF and negatively affect comfort should be tried to be improved. PDF is an important problem for hemodialysis patients and negatively affects patients' comfort. PDF and comfort should be routinely evaluated in patients receiving hemodialysis treatment. Hemodialysis nurses should be aware and educated about the fact that PDF is an important symptom. Hemodialysis nurses should question PDF and should not underestimate it.

Ethics Committe Approval

Ethics committee approval was received for this study from the Kirklareli Institute of Health Sciences Research Ethics Committee (Date: 20.06.2022, and Approval Number: P4506R0)

Author Contributions

Idea/Concept: Ö.Ö.; Design: Ö.Ö; Supervision/Consulting: Ö.Ö; Analysis and/or Interpretation: Ö.Ö; Literature Search: Ö.Ö; Writing the Article: Ö.Ö; Critical Review: Ö.Ö.

Peer-review

Externally peer-reviewed

Conflict of Interest

The authors have no conflict of interest to declare.

Financial Disclosure

The author declared that this study has received no financial support.

Acknowledgements

We would like to thank all healthcare professionals working in the dialysis center where the study was conducted, and patients participating in the study.

REFERENCES

Bilgiç. Ş., Pamuk Cebeci. S. (2022). Relationship between stressors and comfort level in hemodialysis patients. *Archives of Health Science and Research, 9*(2),105–109. doi:10.54614/ArcHealthSciRes.2022.21146

Borzou. S. R., Anosheh. M., Mohammad. E., Kazemnejad. A. (2014). Patients' perception of comfort facilitators during hemodialysis procedure: A qualitative study. *Iranian Red Crescent Medical Journal, 16*(7), e19055. doi.org:10.5812/ircmj.19055

Bossola. M., Di Stasio. E., Giungi. S., Rosa. F., Tazza. L. (2015). Fatigue is associated with serum interleukin-6 levels and symptoms of depression in patients on chronic hemodialysis. *Journal of Pain and Symptom Management, 49*(3), 578–85. https://doi.org/10.1016/j.jpainsymman.2014.07.009

Bossola. M., Marzetti. E., Di Stasio. E., Monteburini. T., Cenerelli. S., Mazzoli., …Vulpio. C. (2018). Prevalence and associated variables of post-dialysis fatigue: Results of a prospective multicentre study. *Nephrology, 23*(6), 552–58. https://doi.org/10.1111/nep.13059

Bossola. M., Picca. A., Monteburini. T., Parodi. E., Santarelli. S., … Di Stasio. E. (2021). Postdialysis fatigue and survival in patients on chronic hemodialysis. *Journal of Nephrology, 34*(6), 2163–65.doi: 10.1007/s40620-021-01141-8.

Bossola. M., Tazza. L. (2016). Postdialysis Fatigue: A frequent and debilitating symptom. *Seminars in Dialysis, 29*(3), 222–27. doi:10.1111/sdi.12468

Bossola. M., Vulpio. C., Tazza. L. (2011). Fatigue in chronic dialysis patients. *Seminars in Dialysis, 24*(5), 550-55. doi:10.1111/j.1525-139X.2011.00956

Boudiab. L. D., Kolcaba. K. (2015). Comfort theory: Unraveling the complexities of veterans' health care needs. *Advances in Nursing Science, 38*(4), 270–78. doi:10.1097/ANS.0000000000000089

Daugirdas J. T. (1993). Second generation logarithmic estimates of single-pool variable volume Kt/V: an analysis of error. *Journal of the American Society of Nephrology, 4*(5), 1205-13. doi:10.1681/ASN.V451205

Debnath. S., Rueda. R., Bansal. S., Kasinath. B. S., Sharma. K., Lorenzo. C. (2021). Fatigue characteristics on dialysis and non-dialysis days in patients with chronic kidney failure on maintenance hemodialysis. *BMC Nephrology, 22*(1), 112. doi:10.1186/s12882-021-02314-0

Dikmen. R. D., Aslan. H. (2020). Clinical Nephrology and renal care the effects of the symptoms experienced by patients receiving hemodialysis treatment on their comfort levels. *Journal Of Clinical Nephrology and Renal Care, 6*(60), 2–9.doi: 10.23937/2572-3286/1510060.

Dubin. R. F., Teerlink. J. R., Schiller. N. B., Alokozai. D., Peralta. C. A., Johansen. K. L. (2013). Association of segmental wall motion abnormalities occurring during hemodialysis with post-dialysis fatigue. *Nephrology Dialysis Transplantation, 28(*10), 2580–85. doi:10.1093/ndt/gft097

Elsayed. M. M., Zeid. M. M., Hamza O. M. R., Elkholy. N. M. (2022). Dialysis recovery time: associated factors and its association with quality of life of hemodialysis patients. *BMC Nephrology, 23*(1), 298. doi:10.1186/s12882-022-02926-0

Estridge. K., Morris. D., Kolcaba. K., Winkelman. C. (2018). Comfort and fluid retention in adult patients receiving hemodialysis. *Nephrology Nursing Journal, 45*(1), 25–33.

Gülay. T., Özdemir Eller. Ç., Ökdem. Ş., Akgün Çıtak. E. (2020). Hemodiyaliz hastalarında konfor düzeyinin incelenmesi. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi, 7*(2), 122–29. doi.:10.31125/hunhemsire.763155

Joshwa. B., Peters. R. M., Malek. M. H., Yarandi. H. N., Campbell. M. L. (2020). Multiple Dimensions and Correlates of Fatigue in Individuals on Hemodialysis. *Nephrology Nursing Journal: Journal of the American Nephrology Nurses' Association, 47*(3), 215–51. doi: 10.37526/1526-744x.2020.47.3.215.

Kacaroğlu Vicdan. A. (2020). The Effect of Training Given to hemodialysis patients according to the comfort theory. *Clinical Nurse Specialist, 34*(1), 30–7. doi: 10.1097/NUR.0000000000000495.

Kang. H., Chae. Y. (2021). Effects of integrated indirect forest experience on emotion, fatigue, stress and immune function in hemodialysis patients. *International Journal of Environmental Research and Public Health, 18*(4), 1–12. doi: 10.3390/ijerph18041701

Kodama. H., Togari. T., Konno. Y., Tsuji. A., Fujinoki. A., Kuwabara. S., Inoue, T. (2020). A new assessment scale for postdialysis fatigue in hemodialysis patients. *Renal Replacement Therapy, 6*(1), 3-6. doi: 10.1186/s41100-019-0252-5.

Kolcaba. K. (1994). A theory of holistic comfort for nursing. *Journal of Advanced Nursing, 19*(6), 1178–84.

Li. H., Yin. J., Dong. Y., Tian., Z. (2023). Factors predicting postdialysis fatigue of maintenance hemodialysis patients. *Renal Replacement Therapy, 9*(30),1-8. doi: 10.1186/s41100-023-00486-z

McIntyre, C. W., Burton, J. O., Selby, N. M., Leccisotti, L., Korsheed, S., Baker, C. S., Camici, P. G. (2008). Hemodialysis-induced cardiac dysfunction is associated with an acute reduction in global and segmental myocardial blood flow. *Clinical journal of the American Society of Nephrology, 3*(1), 19–26. doi: 10.2215/CJN.03170707

Melo. G. A. A., Aguiar. L. L., Silva. R. A., Quirino. G. da S., Pinheiro. A. K. B., Caetano. J. Á. (2019). Factors related to impaired comfort in chronic kidney disease patients on hemodialysis. *Revista Brasileira de Enfermagem, 72*(4), 889–95. doi: 10.1590/0034-7167-2018-0120

Ozen. N., Aydin Sayilan. A., Bal Ozkaptan. B., Neves Sousa. C., Unver. V. (2021). The reliability and validity of the Turkish version of the postdialysis fatigue scale. *International Journal of Clinical Practice, 75*(11), e14871. doi:10.1111/ijcp.14871

Özer. Z., Alkın Demir. C. (2022). Hemodiyaliz tedavisi alan hastalarda semptom ve konfor ilişkisi. *Nefroloji Hemşireliği Dergisi, 1*(17), 10–20. doi: 10.47565/ndthdt.2022.49.

Provenzano. M., Coppolino. G., Faga. T., Garofalo. C., Serra. R., Andreucci. M. (2019). Epidemiology of cardiovascular risk in chronic kidney disease patients: The real silent killer. *Reviews in Cardiovascular Medicine, 20*(4), 209–20. doi:10.31083/J.RCM.2019.04.548

Registry of The Nephrology, Dialysis, and Transplatation (2021). Registry of the nephrology, dialysis and transplantation in Türkiye Registry 2022. Erişim tarihi 25. Nisan 2023, https://nefroloji.org.tr/uploads/files/REGISTRY_2022.PDF

Şahin Orak, N., Çinar Pakyüz, S., Kartal, A. (2017). Ölçek Geliştirme çalışması: hemodiyaliz hastalarında konfor. Nefroloji Hemşireliği Dergisi, 2(12), 68–77.

Santos, R. C. D., Melo, G. A. A., Silva, R. A., Silva, F. L. B. D., Viana Júnior, A. B., Caetano, J. Á. (2020). Relationship between the comfort level of chronic renal patients and sociodemographic and clinical variables. *Revista Brasileira de Enfermagem, 73*(5), e20200085. doi: 10.1590/0034-7167-2020-0085.

Smokovska, N., Grozdanovski, R., Spasovski, G. (2015). Impact of different variables on recovery time in patients receiving hemodialysis. *BANTAO Journal, 13*(1), 20–24. https://doi.org/10.1515/bj-2015-0005

Tabiee, S., Momeni, A. Saadatjoo, S. A. (2017). The effects of comfort-based ınterventions (Back massage and patient and family education) on the level of comfort among hemodialysis patients. *Modern Care Journal, 14*(3). e64687. doi:10.5812/modernc.64687

You, Q., Bai. D. X., Wu. C. X., Chen. H., Hou. C. M., Gao. J. (2022). Prevalence and Risk Factors of Postdialysis Fatigue in Patients Under Maintenance Hemodialysis: A Systematic Review and Meta-Analysis. *Asian Nursing Research, 16*(5), 292–98. doi: 10.1016/j.anr.2022.11.002.

Zadrazil, J., Horak, P. (2015). Pathophysiology of anemia in chronic kidney diseases: A review. *Biomedical Papers, 159*(2), 197–202. doi.:10.5507/bp.2013.093