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Nonadherence in Hemodialysis Patients and Related Factors: A Multicenter Study

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ABSTRACT

Background: Nonadherence to dietary and fluid restrictions, hemodialysis (HD), and medication treatment has been shown to increase the risks of hospitalization and mortality significantly. Sociodemographic and biochemical parameters as well as psychosocial conditions such as depression and anxiety are known to affect nonadherence in HD patients. However, evidence related to the relative importance and actual impact of these factors varies among studies.

Purpose: The aim of this study was to identify the factors that affect nonadherence to dietary and fluid restrictions, HD, and medication treatment.

Methods: This descriptive study was conducted on 274 patients who were being treated at four HD centers in Turkey. The parameters used to determine nonadherence to dialysis treatment were as follows: skipping multiple dialysis sessions during the most recent 1-month period, shortening a dialysis session by more than 10 minutes during the most recent 1-month period, and Kt/V < 1.4. The parameters used to determine nonadherence to dietary and fluid restriction were as follows: serum phosphorus level > 7.5 mg/dl, predialysis serum potassium level > 6.0 mEq/L, and interdialytic weight gain > 5.7% of body weight. The Morisky Green Levine Medication Adherence Scale was performed to determine nonadherence to medication treatment. A patient was classified as nonadherent if he or she did not adhere to one or more of these indices. The Hospital Anxiety and Depression Scale was used to identify patient risk in terms of anxiety and depression. Logistic regression was used to determine the predictors of nonadherence.

Results: The nonadherence rate was 39.1% for dietary and fluid restrictions, 33.6% for HD, and 20.1% for medication. The risk of nonadherence to dietary and fluid restriction was found to be 4.337 times higher in high school graduates (95% CI [1.502, 12.754], $p = .007$). The risk of nonadherence to HD treatment was 2.074 times higher in men (95% CI [1.213, 3.546], $p = .008$) and 2.591 times higher in patients with a central venous catheter (95% CI [1.171, 5.733], $p = .019$). Longer duration in HD resulted in 0.992 times decrease in risk of nonadherence to treatment (95% CI [0.986, 0.998], $p = .005$).

Conclusions/Implications for Practice: Educational status, being male, having a central venous catheter, and having a short HD duration were found to be risk factors for nonadherence. Nurses must consider the patient's adherence to the dietary and fluid restrictions, HD, and medication treatment at each visit.

KEY WORDS:
nonadherence, treatment, hemodialysis, dietary and fluid restrictions, medication.

Introduction

Hemodialysis (HD) is a treatment method that requires adherence to prescribed medication, dialysis treatment, and dietary and fluid restrictions to ensure success (Denhaerynck et al., 2007). Adherence is defined as "the extent to which a person's behavior corresponds with the agreed recommendations of a healthcare provider in terms of taking medications, following a recommended diet and/or executing lifestyle changes" (Sabaté, 2003). Nonadherence to dialysis treatment results in undesirable consequences such as bone demineralization, pulmonary edema, and metabolic disorders and leads to the development of cardiovascular disorders and, finally, death (Denhaerynck et al., 2007). Nonadherence to dietary and fluid restrictions and medication treatment were found in the Dialysis Outcomes and Practice Patterns Study (Saran et al., 2003) to increase the risks of hospitalization and mortality significantly.

Nonadherence to dialysis treatment has been generally reported at rates between 8.5% and 22.1% worldwide and, in one study, as high as 86% (Matteson & Russell, 2010). Failure to attend all dialysis sessions, which is an important indicator of adherence to dialysis treatment, has also been noted at rates of 7%–32% (Durose, Holdsworth, Watson, & Przygrodzka, 2004; Saran et al., 2003). In HD patients, nonadherence to fluid restrictions has been reported as 9.7%–75.3% (Kugler, Maeding, & Russell, 2011); nonadherence to dietary restrictions, as 2%–80.4% (Kugler et al., 2011; Saran et al., 2003); and nonadherence to medication treatment, as 15.4%–99% (Saran et al., 2003).

HD patients should take responsibility for many aspects of their treatment to successfully manage this chronic condition. These aspects include dietary and fluid restriction adherence,

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medication adherence, and attending all HD sessions (Kammerer, Garry, Hartigan, Carter, & Erlich, 2007). Dietary and fluid restriction adherence is crucial for treatments to be successful, and failure may lead to increased rates of complications (and related costs) and decreased survival (Unruh et al., 2005). Study findings have shown associations between nonadherence and sociodemographic factors such as age, gender, and educational level as well as social support status, dialysis duration, vascular access used, anxiety, depression, smoking, and alcohol use with the nonadherence (Akman et al., 2007; Clark, Farrington, & Chilcot, 2014; Higgins, 2006; Jin, Sklar, Min Sen Oh, & Chuen Li, 2008; Russell et al., 2011).

Understanding the factors that may influence treatment outcomes in patients on HD is important for the delivery of optimum healthcare. However, the number of studies that have investigated the effects of patient sociodemographic and psychosocial statuses on adherence is inadequate (Karamanidou, Clatworthy, Weinman, & Horne, 2008; Saran et al., 2003; Unruh et al., 2005). Furthermore, the effects of anxiety on HD patients are unknown (Feroze, Martin, Reina-Patton, Kalantar-Zadeh, & Kopple, 2010), and no study has investigated the relationship between anxiety and adherence in HD patients (Mellon, Regan, & Curtis, 2013).

Thus, the purposes of this study were (a) to evaluate the prevalence of patient nonadherence in terms of dietary and fluid restrictions, HD, and medication treatment and (b) to identify the factors that influence nonadherence in patients undergoing HD.

Methods

Design and Sample

This descriptive study was conducted between November 2015 and June 2016 at four dialysis centers in Ankara, the capital of Turkey. Inclusion criteria were as follows: (a) patients who had received HD treatment for 4 hours a day, 3 days a week for a minimum of 6 months; (b) age of 18 years or older; (c) no communication problems; and (d) no Alzheimer disease or any psychiatric problems related to cognitive disorders such as psychosis. The study was completed with 274 patients who met the inclusion criteria and agreed to participate.

Data Collection

Data collection forms were completed by the investigators based on face-to-face interviews given during the second hour of HD treatment. Three investigators collected the data. One had a dialysis nurse certificate, and the remaining two had worked in a dialysis unit for 1 year. The medical data were recorded by the investigators based on patient medical charts. The patients were asked to think about the most recent month when answering the questions. Completion of the form took about 15–20 minutes.

Ethical Consideration

Permission was obtained from the hospital ethics committee (Gulhane Military Medical Academy Ethical Committee, Session Number: 12, Registration Number: 383) and the dialysis centers where the study was conducted. After the purpose of the study was explained to the patients by the investigators, written consent was obtained from those who agreed to participate.

Measures

Sociodemographic and clinical details

The sociodemographic and clinical information form was developed by the investigators after reviewing the relevant literature (Denhaerynck et al., 2007; Kim, Evangelista, Phillips, Pavlish, & Kopple, 2010; Kugler et al., 2011; Matteson & Russell, 2010). Information on age, gender, marital status, employment status, income category, education, smoking status, type of vascular access used, duration of dialysis, cause of chronic kidney failure, and comorbidity status were gathered using this form.

Psychosocial Measures

Hospital Anxiety and Depression Scale

This scale was developed by Zigmond and Snaith (1983) to identify risks of anxiety and depression in patients and also to measure changes in level and severity of these risks. The Hospital Anxiety and Depression Scale (HADS) is widely used for initial assessments of depression and/or anxiety disorders and is commonly used with HD patients (Cukor et al., 2008; Mellon et al., 2013; Sharp, Wild, Gumley, & Deighan, 2005). The validity and reliability of the scale were tested in Turkey by Aydemir, Güvenir, Küey, and Kültür (1997). The scale is used to diagnose anxiety and depression quickly and to determine risk groups. It is not intended for use as a tool to diagnose patients with physical diseases. Half (7) of the 14 questions measure anxiety, and the other half (7) measure depression. The responses are scored from 0 to 3 using a 4-point Likert scale. The total possible range of scores for this scale is 0–21. The cutoff points for the Turkish version of HADS were found to be 10 for the anxiety subscale and 7 for the depression subscale (Aydemir et al., 1997). The reliability of the HADS was .64 in this study.

Multidimensional Scale of Perceived Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS), developed by Zimet, Dahlem, Zimet, and Farley (1988), is commonly used with HD patients (Ahrari, Moshki, & Bahrami, 2014; Fincham, Kagee, & Moosa, 2008). The validity and reliability study for this scale was performed in Turkey by Eker and Arkar in 1995. The MSPSS form was reviewed in terms of factor structure, validity, and reliability by Eker, Arkar, and Yaldız in 2001. The 12 items of the scale are all scored using a 7-point Likert-type scale ranging from "definitely no" to "definitely yes." There are three subgroups, consisting of family, friends, and private support, that reflect the support sources and contain four items each. The total possible range of scores for each subscale

TABLE 1.
Descriptive Characteristics of the Patients (N = 274)

Variable	*n*	%
Age (years; *M* and *SD*)	62.57	13.24
Gender		
Female	125	45.6
Male	149	54.4
Educational status		
Illiterate	27	9.9
Literate	41	14.9
Primary school	144	52.6
High school	46	16.8
University and above	16	5.8
Marital status		
Married	219	79.9
Single	26	9.5
Widow	29	10.6
Income status		
Income less than expenses	18	6.6
Income equal to expenses	256	93.4
Employment status		
Working	5	1.8
Not working	269	98.2
Chronic kidney failure cause		
Diabetes	65	23.7
Hypertension	69	25.2
Glomerulonephritis	22	8.0
Unknown	77	28.1
Other[a]	41	15.0
Vascular access used		
Arteriovenous fistula	243	88.7
Central venous catheter	31	11.3
Dialysis duration (months; *M* and *SD*)	67.54	54.98
Comorbidity[b]		
Diabetes	103	37.6
Hypertension	115	42.0
Cardiovascular disease	39	14.2
Hepatitis	18	6.6
Smoking status (yes)	26	9.5
Hospital anxiety score		
Low anxiety risk (0–10)	245	89.4
High anxiety risk (11–21)	29	10.6
Hospital depression score		
Low depression risk (0–7)	53	19.3
High depression risk (8–21)	221	80.7
Social support total score[c] (*M* and *SD*)	52.78	20.71
Family support subdimension score[d] (*M* and *SD*)	20.08	6.94
Friend support subdimension score[d] (*M* and *SD*)	16.71	8.38
Private subdimension score[d] (*M* and *SD*)	15.97	7.87
Morisky adherence score		
Adherence to medication treatment	219	79.9
Nonadherence to medication treatment	55	20.1

[a]Drug toxicity, polycystic kidney, pyelonephritis, urinary tract infection, renal artery stenosis, postsurgery, and urinary tract infection. [b]*n* is folded. [c]Score ranged from 12 to 84. [d]Score ranged from 4 to 28.

is 4–28, and for the MSPSS, it is 12–84. The scale has no cut-off point, and high scores indicate a high level of perceived social support (Eker et al., 2001). The reliability for the MSPSS was .95 in this study.

Nonadherence Measures

Nonadherence was evaluated using parameters that were used in the guide published by the National Kidney Foundation (Hemodialysis Adequacy 2006 Work Group, 2006) and in related studies (Kugler et al., 2011; Matteson & Russell, 2010; Mellon et al., 2013; Saran et al., 2003).

HD treatment nonadherence was defined in this study as (a) skipping more than one dialysis session during the most recent 1-month period, (b) shortening a dialysis session by > 10 minutes during the most recent 1-month period, and (c) Kt/V < 1.4. Nonadherence to dietary and fluid restrictions was defined as (a) serum phosphorus level > 7.5 mg/dl, (b) predialysis serum potassium level > 6.0 mEq/L, and (c) interdialytic weight gain (IDWG) > 5.7% of body weight. Medication nonadherence was defined using the Morisky Green Levine Medication Adherence Scale. A patient was classified as nonadherent if he or she did not adhere to one or more of these indices (Mellon et al., 2013).

IDWG was defined as the difference between predialytic weight and the weight at the end of the previous dialysis session, as averaged over 12 HD sessions (Mellon et al., 2013). If a patient was unable to attend a session because of hospitalization, this was not counted as nonadherence. The Daugirdas formula was used to calculate the Kt/V value (Daugirdas, 1993). Serum potassium, phosphorus, and Kt/V values were obtained by taking the average of the patient values over the last 3 months.

Morisky Green Levine Medication Adherence Scale

The previously validated, four-item Morisky Green Levine Medication Adherence Scale was used to assess self-reported medication adherence (Morisky, Green, & Levine, 1986). Each item in this scale queries the patient on whether a specific nonadherence behavior has taken place. Each of the items is answered with either "yes" (1) or "no" (0). The total possible range of scores for this scale is 0–4, with a higher

TABLE 2.
Distribution of the Parameters Used to Evaluate Nonadherence (N = 274)

Parameter	*n*	%
IDWG > 5.7% of dry weight	17	6.2
Serum phosphorus > 7.5 mg/dl	75	27.4
Predialysis serum potassium > 6.0 mEq/L	41	15.0
Skipped ≥ 1 hemodialysis session per month	20	7.3
Shortened session by ≥ 10 minutes	–	–
Kt/V < 1.4	82	29.9

Note. IDWG = interdialytic weight gain.

TABLE 3.

Relationship Between Nonadherence to Dietary and Fluid Restrictions, HD, and Medication Treatment and the Sociodemographic and Medical Characteristics of the Patients (N = 274)

	Dietary and Fluid Restriction						HD Treatment			
	Nonadherent (*n* = 107, 39.1%)		Adherent (*n* = 167, 60.9%)				Nonadherent (*n* = 92, 33.6%)		Adherent (*n* = 182, 66.4%)	
Variable	***n***	**%**	***n***	**%**	**Statistic**	***p***	***n***	**%**	***n***	**%**
Age (years; *M* and *SD*)	60.66	13.46	63.79	12.9	1.943[a]	.052	61.64	12.03	63.04	13.82
Gender					1.432[b]	.231				
Female	44	41.1	81	48.5			32	34.8	93	51.1
Male	63	58.9	86	51.5			60	65.2	89	48.9
Educational level					11.478[b]	.022				
Illiterate	7	6.5	20	12.0			8	8.7	19	10.4
Literate	20	18.7	21	12.5			12	13.0	29	15.9
Primary school	48	44.9	96	57.5			48	52.2	96	52.8
High school	26	24.3	20	12.0			18	19.6	28	15.4
University and above	6	5.6	10	6.0			6	6.5	10	5.5
Employment status					3.588[c]	.078				
Working	4	3.7	1	0.6			3	3.3	2	1.1
Not working	103	96.3	166	99.4			89	96.7	180	98.9
Marital status					0.941[b]	.625				
Married	87	81.3	132	79.0			77	83.7	142	78.0
Single	11	10.3	15	9.0			7	7.6	19	10.5
Widow	9	8.4	20	12.0			8	8.7	21	11.5
Income status					0.235[b]	.628				
Income less than expenses	8	7.5	10	6.0			6	6.5	12	6.6
Income equal to expenses	99	92.5	157	94.0			86	93.5	170	93.4
Smoking status					0.128[b]	.721				
Smokes	11	10.3	15	9.0			14	15.2	12	6.6
Does not smoke	96	89.7	152	91.0			78	84.8	170	93.4
Erythropoietin use status					0.016[b]	.900				
Using	30	28.0	48	28.7			28	30.4	50	27.5
Not using	77	72.0	119	71.3			64	69.6	132	72.5
Vascular access used					1.280[b]	.258				
Arteriovenous fistula	92	86.0	151	90.4			76	82.6	167	91.8
Central venous catheter	15	14.0	16	9.6			16	17.4	15	8.2
Duration in dialysis (months; *M* and *SD*)	63.73	54.83	69.97	55.10	1.076[a]	.083	53.85	40.52	74.45	59.92
Chronic kidney failure reason										
Diabetes	16	14.9	49	29.3			22	23.9	43	23.6
Hypertension	28	26.2	41	24.6			22	23.9	47	25.8
Glomerulonephritis	11	10.3	11	6.6			10	10.9	12	6.6
Unknown	33	30.8	44	26.3			27	29.3	50	27.5
Other	19	17.8	22	13.2			11	12.0	30	16.5
Presence of diabetes					1.165[b]	.280				
Yes	67	40.1	36	33.6			39	42.4	64	35.2
No	100	59.9	71	66.4			53	57.6	118	64.8
Presence of hypertension					1.517[b]	.218				
Yes	75	44.9	40	37.4			30	32.6	85	46.7
No	92	55.1	67	62.6			62	67.4	97	53.3

		Medication Treatment					
		Nonadherent (*n* = 55, 20.1%)		Adherent (*n* = 219, 79.9%)			
Statistic	*p*	*n*	%	*n*	%	Statistic	*p*
1.258[a]	.208	60.32	15.26	63.13	12.66	0.904[a]	.366
6.558[b]	.010					0.776[b]	.378
		28	50.9	97	44.3		
		27	49.1	122	55.7		
1.280[b]	.865					3.325[b]	.505
		6	10.9	21	9.6		
		5	9.1	36	16.4		
		30	54.6	114	52.1		
		12	21.8	34	15.5		
		2	3.6	14	6.4		
1.594[c]	.339					5.061[c]	.024
		3	5.5	2	0.9		
		52	94.5	217	99.1		
1.229[b]	.541					0.291[b]	.864
		44	80.0	175	79.9		
		6	0.9	20	9.1		
		5	9.1	24	11.0		
0.001[b]	.982					0.713[b]	.398
		5	9.1	13	5.9		
		50	90.9	206	94.1		
5.292[b]	.021					0.162[b]	.688
		6	10.9	20	9.1		
		49	89.1	199	90.9		
0.263[b]	.608					2.107[b]	.147
		20	36.4	58	26.5		
		35	63.6	161	73.5		
6.098[b]	.024					3.235[b]	.072
		45	81.8	198	90.4		
		10	18.2	21	9.6		
2.628[a]	.009	78.12	58.36	64.88	53.91	90.465[a]	.050
2.396[b]	.663						
		14	25.5	51	23.3	2.960[b]	.565
		14	25.5	55	25.1		
		5	9.1	17	7.8		
		11	20.0	66	30.1		
		11	20.0	30	13.7		
1.360[b]	.243					0.272[b]	.602
		19	34.5	84	38.4		
		36	65.5	135	61.6		
4.984[b]	.026					1.558[b]	.212
		19	34.5	96	43.8		
		36	65.5	123	56.2		

TABLE 3.

Relationship Between Nonadherence to Dietary and Fluid Restrictions, HD, and Medication Treatment and the Sociodemographic and Medical Characteristics of the Patients (N = 274), Continued

	Dietary and Fluid Restriction						HD Treatment			
	Nonadherent (*n* = 107, 39.1%)		Adherent (*n* = 167, 60.9%)				Nonadherent (*n* = 92, 33.6%)		Adherent (*n* = 182, 66.4%)	
Variable	*n*	%	*n*	%	Statistic	*p*	*n*	%	*n*	%
Presence of cardiovascular disease					0.074[b]	.785				
Yes	16	15.0	23	13.8			16	17.4	23	12.6
No	91	85.0	144	86.2			76	82.6	156	87.4
Presence of pulmonary disease					1.566[b]	.211				
Yes	–	–	1	0.9			1	1.1	–	–
No	167	100.0	106	99.1			91	98.9	182	100.0
Hospital anxiety score					0.074[b]	.786				
The anxiety risk is low (0–10)	95	88.8	150	89.8			81	88.0	164	90.1
The anxiety risk is high (11–21)	12	11.2	17	10.2			11	12.0	18	9.9
Hospital depression score					0.521[b]	.470				
The depression risk is low (0–7)	23	21.5	30	18.0			16	17.4	37	20.3
The depression risk is high (8–21)	84	78.5	137	82.0			76	82.6	145	79.7
Social support total score (*M, SD*)	52.55	19.54	52.93	21.48	0.224[a]	.823	52.30	20.60	53.02	20.82
Family support	19.43	7.19	20.50	6.77	–1.162[a]	.245	19.57	7.27	20.34	6.78
Friend support	15.64	7.92	17.40	8.62	–1.894[a]	.058	16.30	8.62	16.92	8.27
Private support	14.53	7.29	16.90	8.11	–2.539[a]	.011	14.76	7.77	16.59	7.88

[a]Mann–Whitney *U* test. [b]Chi-square test. [c]Fisher's exact test.

score indicating a higher degree of self-reported nonadherence. In this study, patients with a score of 0 were categorized as "adherent," whereas all others were categorized as "nonadherent," following the example of Khanderia et al. (2008). The reliability of the Morisky Green Levine Medication Adherence Scale was .796 in this study.

Data Analysis

SPSS for Windows Version 15.0 (SPSS Inc., Chicago, IL, USA) was used to evaluate the data and to conduct statistical analyses. Descriptive statistics were presented in terms of numbers and percentages for discrete variables (such as gender and marital status) and as mean ± standard deviation for continuous variables (such as age, calcium, and albumin value). The compliance of the data with a normal distribution was evaluated using the Kolmogorov–Smirnov test. The Mann–Whitney *U* test was used for intergroup comparisons to identify nonnormal distributions. The chi-square test was used for nominal data in pairwise comparisons. Multivariable logistic regression analysis was used to determine the factors that influenced nonadherence, with variables having a p value of .25 or less in the single comparisons included in the regression analysis as candidates. In addition, clinically significant variables (marital, income, and smoking status; use of erythropoietin; and IDWG) were included in the regression analysis. A p value < .05 was accepted as an indicator of a significant difference in statistical decisions.

Results

Patient Characteristics

The descriptive characteristics of our patients are presented in Table 1. The mean age was 62.57 years (*SD* = 13.24 years); 54.4% were female, 52.6% were primary school graduates, and 79.9% were married. The cause of chronic kidney failure was hypertension in 25.2%, and the mean HD treatment duration was 67.54 months (*SD* = 54.98 months). The anxiety risk was low in 89.4%, and the depression risk

		Medication Treatment					
		Nonadherent (*n* = 55, 20.1%)		Adherent (*n* = 219, 79.9%)			
Statistic	*p*	*n*	%	*n*	%	Statistic	*p*
1.131[b]	.287					0.128[b]	.721
		7	12.7	32	14.6		
		48	87.3	187	85.4		
1.986[b]	.159					0.252[b]	.616
		–	–	1	0.5		
		55	100.0	218	99.5		
0.276[b]	.600					0.162[b]	.687
		50	90.9	195	89.0		
		5	9.1	24	11.0		
0.338[b]	.561					0.059[b]	.807
		10	18.2	43	19.6		
		45	81.8	176	80.4		
0.148[a]	.882	48.00	22.24	53.98	20.18	1.679[a]	.093
–0.800[a]	.423	21.47	6.15	19.73	7.10	–1.542[a]	.123
–0.549[a]	.583	18.36	8.55	16.30	8.31	–1.749[a]	.080
–1.863[a]	.063	18.01	7.64	15.46	7.87	–2.038[a]	.042

was high in 80.7%. The total social support score was 52.78 (*SD* = 20.71).

Nonadherence Measures

The distribution of the parameters used in the evaluation of nonadherence is presented in Table 2. IDWG was > 5.7% of dry weight in 6.2% of the patients, serum PO_4 was > 7.5 mg/dl in 27.4%, and predialysis serum potassium was > 6.0 mEq/L in 15.0%. Kt/V was < 1.4 in 29.9% of the patients.

The comparison of the patients' nonadherence to dietary and fluid restrictions, HD, and medication treatment are presented in Table 3 together with their sociodemographic and medical characteristics. The nonadherence rate was 39.1% for dietary and fluid restrictions, 33.6% for HD, and 20.1% for medication.

Primary school graduates were found to be statistically significantly more adherent to their dietary and fluid restrictions (χ^2 = 11.478, p = .022). Being male (χ^2 = 6.558, p = .010) and not having hypertension (χ^2 = 4.984, p = .026) were more common in the group nonadherent to HD treatment. The percentage of patients who did not smoke (χ^2 = 5.292, p = .021), the percentage with arteriovenous fistula (χ^2 = 6.098, p = .024), and the dialysis duration (Z = 2.628, p = .009) were found to be statistically significantly higher in the group adherent to HD treatment. The employed patient rate was statistically significantly higher in the adherent patient group (χ^2 = 5.061, p = .024). The dialysis duration was also statistically significantly higher in the patients who were nonadherent to their medication compared with those who were adherent (Z = 90.465, p = .050).

Regression Analysis

The results of the logistic regression analysis performed to identify the factors effective on nonadherence of the patients with dietary and fluid restrictions, HD, and medication treatment are shown in Table 4. The risk of nonadherence to dietary and fluid restrictions was found to be 4.337 times higher in high school graduates (95% CI [1.502, 12.754], p = .007). The risk of nonadherence to HD treatment was found to be

TABLE 4.
The Logistic Regression Evaluation of the Factors Affecting Nonadherence (N = 274)

Variable (Reference Value)[a]	β	*OR*	95% CI	*p*
Nonadherence to dietary and fluid restrictions				
Education (illiterate)				
Literate	0.993	2.699	[0.925, 7.880]	.069
Primary school	0.434	1.543	[0.598, 3.978]	.370
High school	1.476	4.377	[1.502, 12.754]	.007
University and above	0.394	1.483	[0.382, 5.760]	.570
Gender (female)				
Male	0.229	0.988	[0.759, 2.124]	.247
Employment status (working)				
Not working	1.187	3.277	[0.337, 31.907]	.307
Hospital depression score (The depression risk is low)				
The depression risk is high	0.187	1.206	[0.637, 2.282]	.565
Hospital anxiety score (The anxiety risk is low)				
The anxiety risk is high	−0.065	0.937	[0.415, 2.117]	.876
Age	−0.013	0.987	[0.967, 1.008]	.225
Nonadherence to hemodialysis treatment[a]				
Gender (female)				
Male	0.730	2.074	[1.213, 3.546]	.008
Vascular access used (arteriovenous fistula)				
Central venous catheter	0.952	2.591	[1.171, 5.733]	.019
Hemodialysis duration	−0.008	0.992	[0.986, 0.998]	.005
Employment status (working)				
Not working	1.075	2.931	[0.460, 18.661]	.255
Hospital depression score (The depression risk is low)				
The depression risk is high	−0.195	0.823	[0.415, 1.633]	.577
Hospital anxiety score (The anxiety risk is low)				
The anxiety risk is high	−0.238	0.788	[0.338, 1.839]	.582

Note. Odds ratio and *p* value are from a logistic regression model.
[a]The backward logistic regression method was used.

2.074 times higher in men (95% CI [1.213, 3.546], $p = .008$). The risk of nonadherence to HD treatment was found to be 2.591 times higher in patients with a central venous catheter (CVC; 95% CI [1.171, 5.733], $p = .019$). A longer duration in HD resulted in 0.992 times lower risk of nonadherence to treatment (95% CI [0.986, 0.998], $p = .005$).

Discussion

This study aimed to identify the risk factors that lead to nonadherence to dietary and fluid restrictions, HD, and medication treatment. The nonadherence rate was found to be 39.1% for dietary and fluid restrictions, 33.6% for HD, and 20.1% for medication. Educational status, being male, having a CVC, and having a short HD duration were identified as significant risk factors for nonadherence.

In this study, the risk of nonadherence to dietary and fluid restrictions was found to be 4.337 times higher in high school graduates than in illiterate subjects. The effect of educational level on nonadherence to dietary and fluid restrictions in HD patients is not clear. Some studies have identified low level of education as a risk factor for nonadherence (Rambod, Peyravi, Shokrpour, & Taghi Sareban, 2010; Safdar, Baakza, Kumar, & Naqvi, 1995), although Chan, Zalilah, and Hii (2012) reported no significant relationship. Some studies have suggested that level of education affects adherence but that understanding treatment instructions and the importance of treatment is probably relatively more important (Krueger, Berger, & Felkey, 2005). Research shows that higher levels of knowledge do not necessarily increase patient adherence (Morgan, 2000). It may be difficult for highly educated patients to adhere because of professional/social obligations and status. These factors require more extensive research using quantitative studies.

This study found that being male is a risk factor for nonadherence to HD treatment. Besides, nonadherence to the treatment decreased as HD duration increased. No significant relationship was found between HD duration and either gender or nonadherence to the treatment in Ibrahim, Hossam, and Belal (2015). Saran et al. (2003) found higher rates of nonadherence to HD treatment in men, whereas Wells (2015) reported that many men thought that they had lost their role because of cultural reasons and that these roles were fulfilled

by other family members. Thus, understanding the opinions of male patients about this issue should be prioritized by healthcare staff, and appropriate support should be provided. The reason for the high incidence of nonadherence in men compared with women may be cultural. Many men may think that they are unable fulfill their household duties when they receive HD treatment for 4 hours a day, 3 days a week, and experience fatigue and drowsiness after dialysis. This loss of autonomy may encourage men to stop perceiving themselves as the "man of the house," which is an important role in the Turkish cultural context.

This study found having a CVC to be a risk factor for nonadherence to HD treatment. The pain and sense of discomfort experienced during the intervention for arteriovenous fistula were reported to be one of the factors making it difficult to adhere to dialysis among the patients in Madeiro, Machado, Bonfim, Braqueais, and Lima (2010). Prior studies have not investigated whether vascular access is a risk factor for nonadherence in HD treatment (Ibrahim et al., 2015; Saran et al., 2003). CVCs used in dialysis treatment cause repeated hospitalizations due to the high risk of infection and thrombosis. Furthermore, they reduce the comfort of patients, cause visual disturbance, and limit mobility (Frykholm et al., 2014). CVCs were found to be a risk factor in our study as well, possibly because of these reasons. Therefore, new studies on the issue are required.

This study found that longer HD duration was associated with a reduced risk of nonadherence to treatment. The reason may be that patients evaluate the effects of dialysis on their body and learn to cope with complications by talking to other patients and the healthcare staff. A longer treatment period typically leads to greater interaction (Chan et al., 2012; McDonald, Garg, & Haynes, 2002). In Allen, Wainwright, and Hutchinson (2011), many patients reported that they received information about the management of their disease through observation during HD treatment and by talking to healthcare staff and other patients. Patients frequently perceive that knowing more about their disorder gives them greater autonomy. Therefore, they regularly try to understand the details of their disease, its treatment, the related medical system, and the unique ways in which their body responds to the treatment.

One limitation of this study is that the sample population was affected by a number of other serious, comorbid illnesses such as diabetes, hypertension, and cardiovascular disease. These comorbidities may have affected biochemical levels in ways that were not controlled for in this study because cross-sectional studies are not able to explore changes in nonadherence behaviors.

Conclusions/Implications for Practice

Educational status, being male, having a CVC, and having a short HD duration were identified as risk factors for nonadherence. These risk factors must be taken into account when planning HD treatment for patients. In developing strategies to improve adherence in HD units, nurses should look for biochemical and behavioral markers of nonadherence, including missed treatments and excess IDWG, among others. Nurses must consider patient adherence to dietary and fluid restrictions, HD, and medication treatment at each visit. One of the main factors in nonadherence is patients not attending dialysis treatment, with possible reasons including transportation problems, forgetting the appointment, and so on. Moreover, adherence patterns may change over time. Therefore, it is essential to collect data regularly on factors that affect nonadherence. In addition, nurses should develop strong support relationships with the patient, identify barriers, and offer strategies to help patients improve adherence. Nursing care plans should be individualized and used in the standard care provided in HD units. The relationship between nonadherence and the related factors should be investigated on larger populations in future studies.

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