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Original Article

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Health Literacy in Hemodialysis Patients in Türkiye

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ABSTRACT

Background: Health literacy (HL) is a concept that indicates people's knowledge and awareness about health and helps individuals management of chronic disease and treatment of their own diseases. Our aim was to determine the health literacy status of patients undergoing hemodialysis treatment and to investigate its relationship with treatment variables.
Methods: This research was conducted with patients on hemodialysis therapy at a hospital in Türkiye. In our study, the Turkish version of the European Union Health Literacy Survey-47.2 was applied to the patients. Medication adherence of the patients was tested by Morisky Medication Adherence Scale.
Results: A total of 152 patients were included in the study. The HL level was perfect at a rate of 7.2%, adequate at a rate of 32.9%, problematic at a rate of 49.3%, and inadequate at a rate of 10.5% of the hemodialysis patients. Emergency admission, missed appointments, number of hospitalizations per year, duration of chronic kidney disease, and drug compliance were found to be similar between groups with limited and adequate HL levels. However, the application rate for cadaveric kidney transplantation in patients with adequate or perfect HL levels (72.1%) was significantly higher than in those with limited or inadequate HL levels (41.8%) ($P < .001$).
Conclusion: Health literacy was found to be inadequate among hemodialysis patients. There was a significant difference in rates of admission for kidney transplantation between health literacy groups. It is seen that hemodialysis patients with high health literacy levels prefer kidney transplantation at a higher rate.
Keywords: Chronic kidney disease, health literacy, medication adherence, hemodialysis, transplantation

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INTRODUCTION

Chronic kidney disease (CKD) is considered one of the most important public health problems worldwide. According to various studies, it is estimated that it will rise to the top among the causes of death worldwide in the coming years. Chronic kidney disease significantly reduces quality of life, increases social and financial costs, and causes end-stage kidney disease, which requires kidney replacement therapy and causes premature death.[1-6]

The physician, health system, and environmental factors have an effect on non-diagnosis in early stages for chronic diseases; however, the individual's tendencies in health are also an important factor. Personal characteristics are at the forefront also in the management of treatment in diagnosed patients. Most properly, access of individuals to medical information, and their understanding and adequate behavior when they become ill in order to maintain a healthy life have gained importance, and the health literacy (HL) concept has emerged.[7] Health literacy provides individuals with the ability to access, understand, and use medical information, thus improving and maintaining their quality of life.[8] Studies on HL have shown that individuals with inadequate or limited HL benefit less from preventive health services,

and chronic disease management is more unsuccessful than those with adequate HL. Mortality and morbidity rates of these individuals are also higher. When the correlation between chronic disease and HL is examined, low HL level is associated with poor disease management and more complications in patients with CKD, asthma, chronic obstructive pulmonary disease, type 2 diabetes, and depression.[9-12]

In this study, we aimed to determine the HL status of patients undergoing hemodialysis treatment in our region and to analyze the correlation of HL with treatment variables.

MATERIAL AND METHODS

This research was conducted between July 1,2019, and July 31, 2019, with patients undergoing hemodialysis therapy due to chronic kidney failure in a hospital, following their written consents. Ethics committee approval was obtained from the Bursa Yüksek İhtisas Training and Research Hospital Clinical Research Ethics Organization (approval number: 2011-KAEK-25, September 6, 2019). Communication with patients was established in the dialysis unit.

Sociodemographic data of the patients, including gender, age, height and weight, education level, occupation, marital status, smoking and alcohol use, and economic status, were recorded. The Turkish version of the European Union Health Literacy Questionnaire-47 (HLS-EU-Q47, see supplement) was administered to the patients via face-to-face interviews. Questionnaire items were subdivided as follows: health care questions 1–16, disease prevention questions 17–31, and health promotion questions 32–47. The perceived difficulty of each item was rated using a four-point Likert scale as follows: 1 = very difficult, 2 = difficult, 3 = easy, and 4 = very easy. Unanswered questions were not scored. Scores were categorized as follows: 0–25 was considered inadequate HL, >25–33 was considered problematic HL, >33–42 was considered adequate HL, and >42–50 was considered excellent HL.

Statistical Analysis

Compatibility of variables with the normal distribution was analyzed using the Shapiro–Wilk test. Continuous variables are expressed as median (minimum–maximum) values. Categorical variables are expressed as n (%). According to the test of normality, the Mann–Whitney *U*-test was used to compare 2 groups, and the Kruskal–Wallis test was used in case of more than two groups. Pearson chi-square, Fisher's exact chi-square, and Fisher–Freeman–Halton tests were used for the comparisons of categorical variables among the groups. Internal consistency of the scales was analyzed using Cronbach α coefficient. The Statistical Package for Social Sciences version 21.0 software (IBM Corp.; Armonk, NY, USA) was used for statistical analysis and $P < .05$ was accepted as statistically significant.

MAIN POINTS

- Existing studies show that the limited HL of patients with CKD has been associated with adverse clinical events, increased hospitalization, and mortality.
- In our study**,** HL level of hemodialysis patients was 7.2% perfect, 32.9% adequate, and 49.3% problematic. Current studies likewise report that the prevalence of low HL is as high as 50% among patients receiving dialysis.
- Limited HL occurs at a significantly lower rate in transplant recipients (14%). This suggests that patients with higher HL are more likely to be transplanted.

RESULTS

The study included 152 (75 females and 77 males) volunteering patients. The response rate was calculated as 92.12%.The mean age of the patients was 58.14 ± 13.02 years (Table 1). There was at least 1 comorbid disease in 84.90% of the participants. The most common comorbid diseases were hypertension (64.50%), cardiovascular disease (41.40%), and diabetes mellitus (29.60%).

The HL level was perfect at a rate of 7.2%, adequate at a rate of 32.9%, and problematic at a rate of 49.3% (Table 2). Among the subheadings of the HL questionnaire, the perfect HL level was highest in questions related to healthcare, at 14.50%. For questions related to disease prevention and health improvement, the perfect HL rates were 7.2% and 7.9%, respectively (Table 2).

There was no significant difference between groups with limited and adequate HL levels in terms of emergency admissions, missed appointments, number of hospitalizations per year, duration of CKD, and drug compliance (Table 3). Regarding kidney transplant data, 38 out of 91 patients (41.8%) with limited or inadequate HL and 44 out of 61 patients (72.1%) with adequate or excellent HL applied for cadaveric kidney transplantation. The difference between them was statistically significant ($P < .001$) (Table 3). Rates of influenza and pneumococcal vaccination were not different among the groups. Compliance with medication was also not different (Table 4).

The health literacy scale's Cronbach α value was 0.82. Periodic examinations and adult vaccination were the most difficult issues for patients on the health literacy scale. The rate of patients who were admitted for kidney transplantation among those with an adequate/perfect HL level was significantly higher than those with a limited/inadequate HL level.

DISCUSSION

According to this study, the HL level was inadequate or problematic in 59.8% of the patients. No statistical difference was found in the comparison between HL groups in terms of adherence to drug use. The relationship between waiting for cadaveric kidney transplantation and HL was found to be significant. Although the level of HL differs between countries, studies show that inadequate and problematic levels vary between 7% and 47%.[13,14] The reliability and validity of the Turkish version

Table 1. Characteristics of the Participants

	n = 152
Age (years)	58.14 ± 13.02 (24-85)
Gender (female/male)	75 (49.30%)/77 (50.70%)
BMI (kg/m^2)	25.30 (16.80-21.50)
Height (cm)	165 (145-85)
Weight (kg)	69 (39-156)
Total time of education (years)	5 (0-15)
Marital status	
Married	115 (75.70%)
Single	23 (15.10%)
Widow	14 (9.20%)
Educational status	
Primary school and lower	85 (55.90%)
Secondary school and high school	51 (33.60%)
University	16 (10.50%)
Profession	
Housewife	60 (40.10%)
Retired	46 (30.30%)
Self-employment	17 (11.20%)
Worker	16 (10.50%)
Unemployed	7 (4.60%)
Technician	3 (2%)
Farmer	1 (0.70%)
Officer	1 (0.70%)
Economic status	
Bad	12 (7.90%)
Moderate	113 (74.30%)
Good	27 (17.80%)
Smoking (yes)	36 (23.70%)
Cigarettes (package/year)	10 (0.50-50)
Alcohol (yes)	8 (5.30%)

Data are given as mean ± standard deviation, median (minimum–maximum), and n (%).

of the HLS-EU-Q47 were demonstrated in a study by Abacıgil et al. This study showed that the 13.1% of the individuals had inadequate and 39.6% had problematic HL levels.[14] In a study by Sorensen et al., 12% of the patients had inadequate HL and 47% had limited HL. In this study, the adequate/perfect HL rate was only 19.5%.[15] Despite the growing awareness of HL in terms of kidney health,[16] few studies have analyzed HL in patients with CKD. Wright et al.[17] found that the prevalence of limited

Table 2. Health Literacy Scores Distributions

	Inadequate HL (%)	Problematic HL (%)	Adequate HL (%)	Perfect HL (%)
General HL	10.50%	49.30%	32.90%	7.20%
Health care HL	5.30%	29.60%	50.70%	14.50%
Disease prevention HL	16.40%	46.10%	30.30%	7.20%
Health improving HL	27.60%	47.40%	17.10%	7.90%

HL, Health literacy.

HL was 18% in 401 patients with CKD stages 1-5. In a study by Cavanaugh et al., in which they analyzed the HL of 480 patients receiving hemodialysis treatment, a limited HL rate of 32% was found.[18] This result is similar to the study conducted by Grubbs et al. on 62 hemodialysis patients.[19] In another study with 260 patients on hemodialysis treatment, the prevalence of limited HL was found to be 15%.[20] Health literacy prevalence changes

Table 3. Comparisons Among Health Literacy Groups

	Health Literacy		
	Limited/ Inadequate (n = 91)	Adequate/ Perfect (n = 61)	*P*
Number of applying to emergency	0 (0-10)	0 (0-2)	.895[a]
Missing appointment	0 (0-3)	0 (0-3)	.182[a]
Influenza vaccination	55 (60.40%)	32 (52.50%)	.330[b]
Pneumococcal vaccination	1 (1.10%)	1 (1.60%)	1.00[c]
Hepatitis carrier	3 (3.30%)	0	.274[c]
Weekly dialysis number	3 (2:3)	3 (2-4)	.618[a]
Hospitalization in the recent year	0 (0:3)	0 (0:3)	.466[a]
CKD duration	6 (0.20-21)	7 (0.30-34)	.290[a]
Medication adherence			
High	18 (40.90%)	16 (41%)	
Medium	15 (34.10%)	13 (33.30%)	.997[b]
Low	11 (25%)	10 (25.60%)	
Hypertension	54 (59.30%)	44 (72.10%)	.106[b]
Systolic blood pressure	125 (85-155)	130 (66-165)	.060[a]
Diastolic blood pressure	80 (55-90)	80 (60-100)	.625[a]
Admission for transplantation	38 (41.80%)	44 (%72.10)	**<.–001[b]**

Data are expressed as median (minimum–maximum), n (%).
CKD, chronic kidney disease.
[a] Mann–Whitney test
[b] Chi-square test.
[c] Fisher's exact chi-square test.

Table 4. Comparisons Among Medication Adherence Groups

	Medication Adherence			
	High (n = 34)	**Medium (n = 28)**	**Low (n = 21)**	***P***
Systolic blood pressure	130 (66:160)	135 (110-150)	135 (110-165)	.895[d]
Diastolic blood pressure	80 (65-100)	80 (70-85)	80 (65-90)	.869[d]
Health service				
Perfect	4 (11.80%)	8 (28.60%)	4 (19%)	
Adequate	18 (52.90%)	13 (46.40%)	9 (42.90%)	.616[e]
Problematic	11 (32.40%)	6 (21.40%)	6 (28.60%)	
Inadequate	1 (2.90%)	1 (3.60%)	2 (9.50%)	
Disease prevention				
Perfect	2 (5.90%)	2 (7.10%)	0	
Adequate	10 (29.40%)	13 (46.40%)	6 (28.60%)	.530[e]
Problematic	18 (52.90%)	9 (32.10%)	11 (52.40%)	
Inadequate	4 (11.80%)	4 (14.30%)	4 (19%)	
Health promotion				
Perfect	3 (8.80%)	2 (7.10%)	1 (4.80%)	
Adequate	6 (17.60%)	8 (28.60%)	1 (4.80%)	.319[e]
Problematic	20 (58.80%)	14 (50%)	12 (57.10%)	
Inadequate	5 (14.70%)	4 (14.30%)	7 (33.30%)	
General				
Perfect	2 (5.90%)	3 (10.70%)	0	
Adequate	14 (41.20%)	10 (35.70%)	10 (47.60%)	.316[e]
Problematic	17 (50%)	13 (46.40%)	7 (33.30%)	
Inadequate	1 (2.90%)	2 (7.10%)	4 (19%)	

Data are expressed as median (minimum–maximum), n (%)
[d] Kruskal–Wallis test
[e] Fisher-Freeman-Halton test

because of differences in the patient population or the use of alternative HL assessment tools. In these studies, limited HL was more prevalent in non-white people and people with low education and income levels.[19-21]

In this study, we found that patients with limited HL applied for kidney transplantation at a lower rate. While 58.2% of the patients in the limited and inadequate HL group did not apply for a cadaveric kidney transplant, 72.1% of the patients in the adequate or perfect HL group applied for a cadaveric kidney transplant. In our center, all patients are provided with information about kidney transplantation. Patients who want to undergo transplantation apply to transplant centers themselves. However, patients with high awareness who can understand the seriousness of the transplantation process and can use immunosuppressive drugs regularly are more encouraged for transplantation. This may have had an effect on the higher rate of patients with adequate HL applying for transplantation. Grubbs et al. reported that access to kidney transplantation is reduced in patients with poor HL. In addition, they stated that among 62 dialysis patients, participants with insufficient HL had a 78% lower kidney transplant application rate than those with an adequate HL level.[19]

In a study performed by Bozkurt et al., questions on deciding which vaccinations are needed and which medical screenings are needed were considered the most difficult questions to answer by the participants, similar to our study. In the same study, questions on following drug usage instructions, calling an ambulance in case of emergency, and following the instructions of a physician or pharmacist were those with the lowest level of "very difficult" answers.[21] Absence of a correlation between HL and vaccination and treatment loyalty of patients in the current study can be a reflection of this situation. It can be concluded that these patients need support for patient education.

In a cohort study of 2274 patients on dialysis, limited HL was independently associated with reduced access to donor transplant listing, transplantation from a living donor, or from any donor type.[22] It has been emphasized that patients with limited HL may have reduced understanding of the consequences of CKD and the benefits of transplantation. Low socioeconomic status and comorbidities may further hinder effective care. In patients with limited HL, sufficient clinician–patient communication and understanding may not be achieved to enable shared decision-making required for successful transplantation.

It is expected that patients with good HL status will have higher compliance with medication use, but in our study, we did not find any difference in medication compliance among the HL groups. This may be due to depressive and cognitive impairment, which are common in dialysis patients, as well as social or economic factors. There was no relationship between the patients' arterial blood pressure results and medication compliance. Ultrafiltration during dialysis can also control blood pressure, making the patient less dependent on blood pressure medication.

Limitations

The limited number of research studies on this subject and the use of different scales prevent us from making an adequate comparison. Medication compliance of hemodialysis patients is also associated with the compliance of the family. Thus, variables that may be related to HL can change with involvement of nurses in the treatment process. This situation may have affected the results of our study.

Although we expected to see differences in HL among hemodialysis patients in terms of missing polyclinic examinations,

vaccination, hospitalization, hypertension treatment, and medication compliance, we detected significant differences only in rates of admission for kidney transplantation from a cadaver. Patients with an adequate or perfect HL level had a significantly higher rate of admission for kidney transplantation from a cadaver compared to those with limited or inadequate HL levels. Increasing the HL level of hemodialysis patients is considered to be important for their inclusion in the kidney transplant waiting list, which is the preferred treatment method in this patient population.

Data Availability Statement: The data that support the findings of this study are available upon request from the corresponding author.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of the Bursa Yüksek İhtisas Training and Research Hospital (approval number: 2011-KAEK-25, September 6, 2019).

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

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Declaration of Interests: The authors have no conflict of interest to declare.

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Annex: The HLS-EU-Q47 of the HLS-EU Consortium for the European Health Literacy Survey (HLS-EU)

HLS-EU-Q47
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Item number	Relation to HLS-EU Matrix	*On a Scale from Very Easy to Very Difficult, How Easy Would You Say It Is to: …*	1 Very Difficult	2 Difficult	3 Easy	4 Very Easy	5 (Don't know—To Be Used by Interviewer Only)
1	Healthcare/Access information	Find information about symptoms of illnesses that concern you?					
2	Healthcare/Access information	Find information on treatments of illnesses that concern you?					
3	Healthcare/Access information	Find out what to do in case of a medical emergency?					
4	Healthcare/Access information	Find out where to get professional help when you are ill?					
5	Healthcare/Understand information	Understand what your doctor says to you?					
6	Healthcare/Understand information	Understand the leaflets that come with your medicine?					
7	Healthcare/Understand information	Understand what to do in a medical emergency?					
8	Healthcare/Understand information	Understand your doctor's or pharmacist's instruction on how to take a prescribed medicine?					
9	Healthcare/Appraise information	Judge how information from your doctor applies to you?					
10	Healthcare/Appraise information	Judge the advantages and disadvantages of different treatment options?					
11	Healthcare/Appraise information	Judge when you may need to get a second opinion from another doctor?					
12	Healthcare/Appraise information	Judge if the information about illness in the media is reliable?					
13	Healthcare/Apply information	Use information the doctor gives you to make decisions about your illness?					
14	Healthcare/Apply information	Follow the instructions on medication?					
15	Healthcare/Apply Information	Call an ambulance in an emergency?					
16	Healthcare/Apply information	Follow instructions from your doctor or pharmacist?					
17	Disease prevention/Access information	Find information about how to manage unhealthy behavior such as smoking, low physical activity, and drinking too much?					

(*Continued*)

Annex: The HLS-EU-Q47 of the HLS-EU Consortium for the European Health Literacy Survey (HLS-EU) (Continued)

HLS-EU-Q47
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Item number	Relation to HLS-EU Matrix	*On a Scale from Very Easy to Very Difficult, How Easy Would You Say It Is to: …*	1 Very Difficult	2 Difficult	3 Easy	4 Very Easy	5 (Don't know—To Be Used by Interviewer Only)
18	Disease prevention/Access information	Find information on how to manage mental health problems like stress or depression?					
19	Disease prevention/Access information	Find information about vaccinations and health screenings that you should have?					
20	Disease prevention/Access information	Find information on how to prevent or manage conditions like being overweight, high blood pressure or high cholesterol?					
21	Disease prevention/Understand information	Understand health warnings about behavior such as smoking, low physical activity, and drinking too much?					
22	Disease prevention/Understand information	Understand why you need vaccinations?					
23	Disease prevention/Understand information	Understand why you need health screenings?					
24	Disease prevention/Appraise information	Judge how reliable health warnings are, such as smoking, low physical activity, and drinking too much?					
25	Disease prevention/Appraise information	Judge when you need to go to a doctor for a check-up?	1 Very difficult	2 Difficult	3 Easy	4 Very easy	5 (Don't know - to be used by interviewer only)
Item no.	Relation to HLS-EU matrix	*On a scale from very easy to very difficult, how easy would you say it is to: …*					
26	Disease prevention/Appraise information	Judge which vaccinations you may need?					
27	Disease prevention/Appraise information	Judge which health screenings you should have?					
28	Disease prevention/Appraise information	Judge if the information on health risks in the media is reliable?					
29	Disease prevention/Apply information	Decide if you should have a flu vaccination?					
30	Disease prevention/Apply information	Decide how you can protect yourself from illness based on advice from family and friends?					
31	Disease prevention/Apply information	Decide how you can protect yourself from illness based on information in the media?					
32	Health promotion/Access information	Find information on healthy activities such as exercise, healthy food and nutrition?					

(*Continued*)

Annex: The HLS-EU-Q47 of the HLS-EU Consortium for the European Health Literacy Survey (HLS-EU) (Continued)

HLS-EU-Q47
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Item number	Relation to HLS-EU Matrix	*On a Scale from Very Easy to Very Difficult, How Easy Would You Say It Is to: …*	1 Very Difficult	2 Difficult	3 Easy	4 Very Easy	5 (Don't know—To Be Used by Interviewer Only)
33	Health promotion/Access information	Find out about activities that are good for your mental well-being?					
34	Health promotion/Access information	Find information on how your neighborhood could be more health-friendly?					
35	Health promotion/Access information	Find out about political changes that may affect health?					
36	Health promotion/Access information	Find out about efforts to promote your health at work?					
37	Health promotion/Understand information	Understand advice on health from family members or friends?					
38	Health promotion/Understand information	Understand information on food packaging?					
39	Health promotion/Understand information	Understand information in the media on how to get healthier?					
40	Health promotion/Understand information	Understand information on how to keep your mind healthy?					
41	Health promotion/Appraise information	Judge where your life affects your health and well- being?					
42	Health promotion/Appraise information	Judge how your housing conditions help you to stay healthy?					
43	Health promotion/Appraise information	Judge which everyday behavior is related to your health?					
44	Health promotion/Apply information	Make decisions to improve your health?					
45	Health promotion/Apply information	Join a sports club or exercise class if you want to?					
46	Health promotion/Apply information	Influence your living conditions that affect your health and wellbeing?					
47	Health promotion/Apply information	Take part in activities that improve health and well-being in your community?					