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Research Article

The Relationship Between Health Literacy, Quality of Life, and Physical Activity Level of Hemodialysis Patients with Chronic Kidney Disease: Cross-Sectional Study

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Abstract

Objective: The aim of this study was to assess the health literacy of patients receiving hemodialysis and to determine the relationship between health literacy, quality of life, and physical activity level.

Methods: The study was conducted in a cross-sectional design with 113 hemodialysis patients who met the inclusion criteria and who were treated at a Private Dialysis Center between September and October 2023. Personal Information Form, European Health Literacy Scale Turkish Adaptation, International Physical Activity Questionnaire Short Form, and Kidney Disease Quality of Life Scale were used for data collection. Data were analyzed using percentage distributions, means, standard deviation, median values, Pearson and Spearman Correlation Analysis, Chi-Square Test, One-Way Analysis of Variance, Kruskal-Wallis Analysis of Variance, and $p<0.05$ was accepted as the cut-off value for statistical significance.

Results: The health literacy level of hemodialysis patients was found to be "problematic" with a mean total scale score of 25.9±82 points. 48.7% of the patients had low physical activity level. Statistical differences were found between personal characteristics such as age, marital status and educational status and health literacy dimensions ($p<0.05$). While a statistically significant relationship was found between health literacy and physical activity value ($p<0.05$), no statistically significant relationship was found with quality of life ($p>0.05$).

Conclusions: Hemodialysis patients should be evaluated at regular intervals individualized interventions should be developed and patients should be guided to increase their health literacy and physical activity levels.

Keywords: Renal Insufficiency, Hemodialysis, Health Literacy, Sedentary Behavior, Quality of Life

1. Introduction

Chronic Kidney Disease (CKD) is an irreversible and progressive condition of kidney function caused by structural and functional changes in the kidneys. It is considered a public health problem due to its increasing incidence and prevalence in recent years (1). It is treated with life-saving renal replacement therapy such as hemodialysis (HD), peritoneal dialysis, or kidney transplantation. Patients experience high rates of functional impairment, morbidity and mortality over time (2).

Important factors contributing to poor outcomes in HD patients include disease-related low physical activity (PA), reduced muscle mass, decreased function and aerobic capacity, forced immobilization during HD sessions and fatigue (3). Several observational studies have shown that low PA is associated with high mortality in patients receiving HD (4, 5). Young et al. showed that the number of steps taken by HD patients during the day is low and PA on dialysis days is lower than on other days (6). Therefore, encouraging PA in HD patients may improve poor outcomes and quality of life (QOL) (7).

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QOL is defined by the World Health Organization as "an individual's perception of his/her position in life in the context of his/her own values and culture according to where he/she lives, wishes, ideas, concerns and expectations" (8). Individual awareness of each person's physical, mental, social, and functional well-being is important to understanding the possible relationships of treatments on quality of life. Dialysis treatment can negatively affect quality of life in terms of its impact on individuals' social/family relationships, physical and psychological well-being. Therefore, assessing the QOL of patients undergoing dialysis treatment is very important because it can increase their rehabilitation possibilities and improve their overall health (9). As the duration of HD treatment increases, patients experience a number of complications and this affects their QOL (10). Studies highlight QOL as a major concern in individuals with end-stage renal failure , as the progression of chronic diseases can be a barrier to life expectancy.

Health literacy (HL) is defined as "the personal knowledge and competencies that enable people to access, understand, evaluate and use information and services in ways that promote and sustain health and well-being for themselves and those around them" (11). An individual's HL skills are important for making decisions about their health. Studies in various patient populations show that limited health literacy is associated with less health-related information, increased risk of hospitalization, less use of preventive health services, decreased medication adherence, poorer health status, and higher healthcare costs (12). HL is extremely important for the care and clinical outcomes of patients, as this patient population needs to pay attention to dietary restrictions to maintain electrolyte and fluid balance, adhere to multiple medications to treat or prevent complications (13, 14). Advanced HL skills are required to manage this situation.

Studies using multidimensional assessment tools for HL show that patients with CKD have deficits in areas related to meeting health needs and understanding health information. Based on this deficiency, our study aimed to assess HL in patients receiving HD and to determine the relationship between HL, QOL, and PA level.

Research question:

What are the health literacy sub-dimensions of patients receiving hemodialysis?

Is there a relationship between health literacy, quality of life and physical activity level of patients receiving hemodialysis?

2. Methods

2.1.Research type, population and sample

This cross-sectional study was conducted to evaluate HL and to determine the relationship between HL, QOL, and PA level in individuals receiving HD treatment in a private dialysis center in a province in northwestern Turkey. The study population consisted of 187 individuals receiving treatment in a dialysis center. The study data were collected between September and October 2023 with 113 volunteer individuals with HD who met the inclusion criteria and agreed to participate in the study. Individuals between the ages of 18 and 65 years, who were cooperative enough to understand the tests and assessments, and who had been on HD treatment for at least six months were included in the study. In addition to CKD, those whose lower extremity functions were affected due to any disease and those who filled out the scale/survey incompletely or invalidly were excluded from the study.

2.2.Data collection instruments

Personal Information Form, European Health Literacy Scale Turkish Adaptation, International Physical Activity Questionnaire Short Form, and Kidney Disease Quality of Life Scale were used as data collection instruments. Data were collected in approximately 30 minutes through a face-to-face questionnaire

method. "Personal Information Form" consisted of five questions such as age, gender, marital status, educational status and disease history.

The adapted version of the "European Health Literacy Scale into Turkish" (HLS-EU-TR) was used to assess HL (15). Abacıgil et al. (2016) conducted validity and reliability studies of the scale and adapted it into Turkish. Cronbach's α value of the scale is 0.95 (15). The scale is a five-point Likert scale and consists of 47 items. 1: Very difficult, 2: Difficult, 3: Easy, 4: Very easy, 5: Don't know. The scale consists of three health-related dimensions such as service health care, disease prevention, and health promotion. The responses were used to calculate the sub-dimensions of health care, disease prevention, health promotion, and total HL. The total score was standardized with the help of a formula to take a value between 0-50. According to these scores, (0-25) points were categorized as inadequate, (>25-33) as problematic, (>33-42) as sufficient, and (>42-50) as excellent HL (15). In our study, the Cronbach's alpha coefficient of this scale was 0.92.

The International Physical Activity Short Form (IPAQ-Short Form), the Turkish validity and reliability of which was established by Öztürk et al. in 2005, was used to determine PA level (16, 17). In IPAQ, the duration of severe and moderate PA in the last week, walking, and one-day sitting times were recorded in minutes. These durations were converted to metabolic equivalents (METs) and PA scores were calculated (MET- minutes/week). Below 600 METs were classified as low-level PA, 600-3000 METs as moderate PA, and 3000 METs and above as high-level PA.

QOL was assessed with the Kidney Disease Quality of Life Scale (KDQOL). The scale was translated into Turkish and its validity and reliability was performed by Yıldırım et al. in 2007 (18). The cronbach's alpha value of the Turkish version is 0.93. The scale consists of kidney disease specific and general sections. The specific section consists of questions to identify problems specific to kidney disease, while the general section is based on the Short Form 36 (SF-36). The questionnaire contains 36 items divided into five dimensions. The section on kidney disease (24 items/ three dimensions) consists of three dimensions: symptom/problem list (12 items), impact of kidney disease (eight items) and burden of kidney disease (four items). The general section (12 items/two dimensions) consists of two dimensions: SF12 physical component (six items) and SF12 mental component (six items). The scale score ranges from 0 to 100. In our study, the Cronbach's alpha coefficient of this scale was 0.88.

2.3.Statistical analysis

SPSS 25.0 (IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.)) package program was used for data analysis. Continuous variables were expressed as mean ± standard deviation and categorical variables as number and percentage. When parametric test assumptions were met, a one-way analysis of variance was used to compare independent group differences; when parametric test assumptions were not met, Kruskal Wallis analysis of variance was used to compare independent group differences. Chi-Square test was used to compare categorical variables. Pearson and Spearman correlation analyses were used to examine the relationships between numerical variables. In all examinations, $p<0.05$ was considered statistically significant.

2.4.Ethics committee approval

Ethics committee permission was obtained from the Ethics Committee of Sakarya University of Applied Sciences and institutional permission was obtained from the unit manager where the study was conducted (decision dated 07.07.2023 and numbered 33/3). The research was conducted in accordance with the rules in the Declaration of Helsinki. Individuals were informed about the study beforehand. Informed consent was obtained from all individuals who volunteered to participate in the study.

3. Results

The mean age of HD patients was 57.8±5.96 years and 53.1% were male. 72.6% of the participants were married, had CRF for a mean of 7.75±6.09 years and had been on HD for a mean of 7.17±5.92 years. Hypertension was identified as the etiology of renal failure in 46.9% and 48.7% were found to have low-level PA (Table 1).

Table 1. Demographic and Clinical Characteristics

		Mean ± S.D	Med (IQR)	min - max
Age (year)		57.8 ± 5.96	60 (55 – 61.5)	38 - 70
Duration of CRF (year)		7.75 ± 6.09	6 (3 - 10)	1 - 32
Duration of dialysis (year)		7.17 ± 5.92	6 (3 – 9.5)	1 - 30
			n	**%**
Gender	Male		60	53.1
	Female		53	46.9
Marital status	Married		82	72.6
	Single		31	27.4
Education	Literate only		10	8.8
	Primary school		56	49.6
	Middle school		27	23.9
	High school		16	14.2
	University and above		4	3.5
Cause of kidney failure	Hypertension		53	46.9
	Glomerulonephritis		7	6.2
	Diabetes		29	25.7
	Urinary tract infections		5	4.4
	Urinary stones		2	1.8
	Polycystic kidney disease		8	7.1
	Idiopathic		9	7.9
IPAQ classification	Low		55	48.7
	Moderate		53	46.9
	High		5	4.4

CRF: Chronic Renal Failure, IPAQ: International Physical Activity Questionnaire,S.D: Standard Deviation, Med (IQR): Median (25th – 75th percentiles)

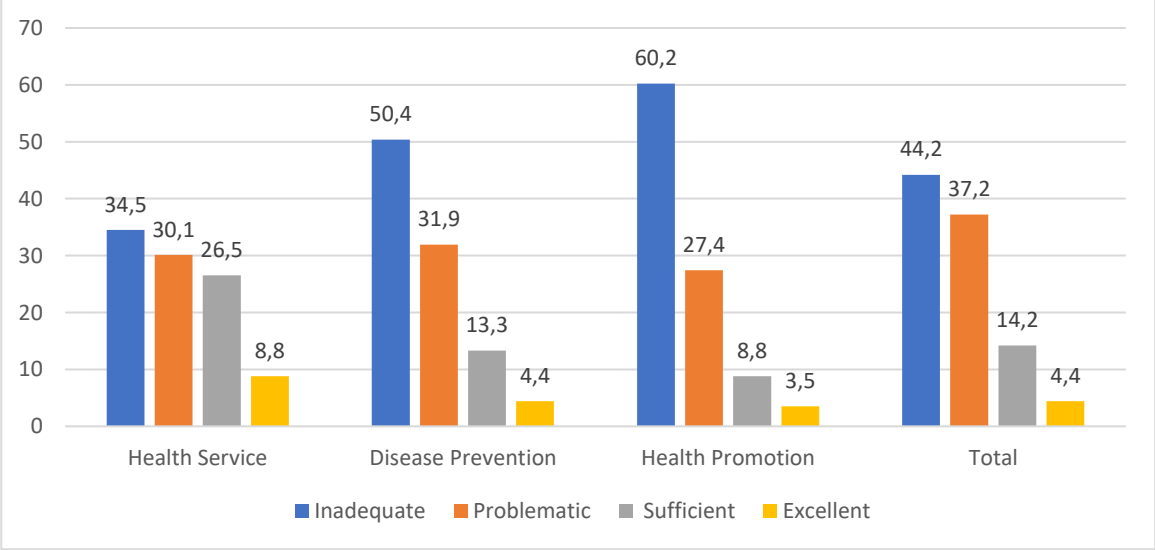
The mean HL total score of the participants was 25.9±8, indicating that these patients had problematic HL. When the HL sub-dimension averages were examined, individuals had problematic HL in the sub-dimensions of Health Service HL (29.37±9.28) and Disease Prevention HL (25.2±9.21), while they had inadequate HL in the sub-dimension of Health Promotion HL (22.7±9.05). The mean IPAQ value of the participants was 925.54 ± 921.93. When the mean scores of KDQOL subscale scores are analyzed, the highest score belongs to the "symptom problem list of kidney disease" subscale (75.59 ± 12.53) and the lowest score belongs to the "burden of kidney disease" subscale (31.43 ± 25.02) (Table 2).

Table 2. Distribution of Mean Scores on The European Health Literacy Scale, International Physical Activity Questionnaire Short Form and Kidney Disease Quality of Life Scale

	Mean ± S.D	Med (IQR)	min - max
HL Subdimensions			
Health service	29.37 ± 9.28	29.16 (22.91 – 34.89)	7.29 - 50
Disease prevention	25.2 ± 9.21	25.55 (20 – 31.11)	1.1 - 50
Health promotion	22.7 ± 9.05	22.61 (15.5 – 28.35)	6.25 - 50
Total	25.9 ± 8	25.88 (20.47 – 31.83)	3.9 - 50
IPAQ value	925.54 ± 921.93	610 (274.5 - 1386)	66 - 4751
Symptom problem list	75.59 ± 12.53	77.08 (66.67 – 85.42)	45.83 - 100
Effect of Kidney Disease	67.09 ± 17.01	68.75 (59.38 – 78.13)	18.75 - 100
Burden of kidney disease	31.43 ± 25.02	31.75 (18.75 – 62.5)	0 - 100
SF12 Physical component	36.68 ± 9.94	36.18 (29.28 – 44.09)	18.93 – 58.49
SF12 Mental component	46.71 ± 9.3	46.94 (41.15 – 54.17)	23.22 – 65.61

HL: Health Literacy, IPAQ: International Physical Activity Questionnaire, SF: Short Form, S.D: Standard Deviation, Med (IQR): Median (25th – 75th percentiles)

The total prevalence of inadequate or problematic levels in all dimensions of HL is above 64%. Inadequate or problematic literacy was found in 64.6% of patients in Health Care HL, 82.3% in Disease Prevention HL, 87.6% in Health Promotion HL and 81.4% in Total HL. Among all sub-dimensions, the highest sufficient HL (26.5%) and the highest excellent HL (8.8%) were reported in the Health Care HL (Graphic 1).



Graphic 1. Distribution of Proficiency Levels According to Health Literacy Sub-Dimensions

There was no statistically significant relationship with gender. When the relationships with age were examined, it was seen that health promotion and total scores had statistically significant, negative, and weak relationships (p=0.008, p=0.015). When analyzed according to marital status; it was seen that the scores of married and widowed individuals were significantly lower than single individuals in all sub-dimensions (p<0.05). When analyzed according to educational status, it was found that in all sub-dimensions, the scores of individuals with high school and above education were significantly higher than those of other educational levels (p<0.05) (Table 3).

Table 3. Comparison of The Mean Scores of Health Literacy Dimensions According to Individual Characteristics

		Health Service	Disease Prevention	Health Promotion	Total
Male	Mean ± SD	30.93 ± 8.36	26.18 ± 6.74	20.46 ± 8.52	26.46 ± 7.11
Female	Mean ± SD	27.61 ± 10.01	24.09 ± 11.34	25.24 ± 9.04	25.27 ± 8.93
	p	0.057 (t=1.922)	0.243 (t=1.175)	0.053 (t=1.355)	0.431 (t=0.79)
Age	r	-0.171	-0.168	-0.249*	-0.228*
	p	0.070	0.075	0.008	0.015
Married	Mean ± SD	27.96 ± 9.45	23.59 ± 8.86	20.9 ± 8.11	24.77 ± 7.6
Single	Mean ± SD	35.88 ± 10.58	34.84 ± 9.51	32.55 ± 12.28	33.84 ± 9.25
Widow	Mean ± SD	28.85 ± 8.82	26.51 ± 7.12	24.66 ± 7	26.19 ± 6.64
	p	0,045* (f=3,185) 1-2	0,003* (kw=11,417) 1-2	0,0001* (f=9,969) 1-2, 2-3	0,001* (f=6,905) 1-2, 2-3
Literate only	Mean ± SD	24.27 ± 10.47	20.28 ± 12.13	21.05 ± 8.21	21.17 ± 9.4
Primary school	Mean ± SD	27.25 ± 8.91	23.43 ± 8.79	21.07 ± 10.06	23.97 ± 7.85
Middle school	Mean ± SD	31.13 ± 6.89	27.41 ± 7.24	21.87 ± 7.88	27.01 ± 5.82
High school and above	Mean ± SD	35.51 ± 9.49	29.65 ± 9.19	29.25 ± 9.97	32.2 ± 6.71
	p	0,001* (f=5.914) 1-4, 2-4	0.009* (f=4.021) 1-4, 2-4	0.007* (kw=12.163) 2-4,3-4	0.0001* (f=7.728) 1-4, 2-4

HL: Health LİteracY, SD: Standard Deviation, Med (IQR): Median (25th – 75th percentiles), F: One Way Analysis of Variance, kw: Kruskal Wallis Variance Analysis, cs: Chi-Square test, r: Spearman Correlation Coefficient, *p<0.05 statistically significant.

There was a statistically significant, positive and moderate correlation between PA value and all HL dimension scores (r=0.454, p=0.000; r=0.433, p=0.000; r=0.462, p=0.000; r=0.404, p=0.000). No statistically significant relationship was found between HL sub-dimensions and QOL sub-dimensions (p>0.05) (Table 4).

Table 4. The Relationship Between Health Literacy Dimensions, Quality of Life Subdimensions and Physical Activity

		Health Service	Disease Prevention	Health Promotion	Total
IPAQ value	r	**0.454*** s	**0.433*** s	**0.462*** s	**0.404*** s
	p	0.000	0.000	0.000	0.000
Symptom problem list	r	0.082 s	0.045 s	-0.041 s	0.110 s
	p	0.388	0.634	0.669	0.248
Effect of kidney disease	r	-0.015 s	0.015 s	0.025 s	0.027 s
	p	0.878	0.871	0.792	0.776
Burden of kidney disease	r	0.139 s	0.051 s	-0.031 s	0.073 s
	p	0.141	0.591	0.745	0.443
SF12 Physical component	r	0.111 pr	-0.009 s	0.054 pr	0.092 pr
	p	0.243	0.923	0.566	0.331
SF12 Mental Component	r	0.184 pr	0.149 s	0.095 pr	0.145 pr
	p	0.052	0.115	0.315	0.112

HL: Health Literacy, IPAQ: International Physical Activity Questionnaire, SF: Short Form, s: Spearman correlation coefficient, pr: Pearson Correlation Coefficient, *p<0.05 statistically significant correlation.

4. Discussion

In our study, the mean HL total score of HD patients was 25.9±82 indicating that they had problematic HL. When the HL sub-dimension averages were examined, it was found that individuals had problematic HL in the health service HL (29.37±9.28) and disease prevention HL (25.2±9.21) dimensions, while they had inadequate HL in the health promotion HL (22.7±9.05) dimension. In a study conducted with individuals with CKD, it was reported that they had inadequate HL according to the average HL total score (19). In a study of Portuguese participants, the mean HL total score was 22.04 ±9.66 and 61.8% were shown to have inadequate health literacy (20). In a study in individuals with stage 4-5 CKD, low HL was found in 72 of 109 patients (66.1%) (21). In a study conducted in elderly individuals, when the mean scores of HL sub-dimensions were examined, problematic HL was found in health care, and inadequate HL was found in disease prevention and health promotion HL (22). In the light of the information in the literature supporting our study, it is important to strengthen the HL of individuals receiving HD treatment. This increases their ability to cope with the disease and enables them to use health services effectively.

In our study, 48.7% of HD patients were found to have low PA. In a recent study conducted to evaluate the PA level of HD patients, it was observed that the PA levels of HD patients were significantly reduced compared to the healthy control group and 72% of them had low PA levels (23). A study of Turkish dialysis patients found that 78.12% of patients had low PA level and only 1% had high PA level (24). Oliveira et al. compared the PA levels of patients receiving HD and conservative treatment for more than six months and less than six months and found no significant difference between the groups. In all groups, low PA was seen in the majority of individuals (25). Similar results were found in studies in the literature. Therefore, it is very important to evaluate HD patients, raise awareness, provide education and recommend PA to individuals.

When the QOL subscale mean scores were analyzed in our study, it was found that the highest score belonged to the "symptom/problem list" subscale and the lowest score belonged to the "burden of kidney disease" subscale. In a study conducted to examine QOL in HD, it was found that the highest score belonged to the "symptom/problem list" (60.41) and the lowest score belonged to the "burden of kidney disease" (18.75) sub-dimension (26). Similarly, the burden of kidney disease was found to be the lowest dimension in different studies in the literatüre (27). In our study, the proficiency levels of HL sub-dimensions were found to be low. Patients had inadequate or problematic literacy in all HL sub-dimensions. Silva and Pimenta found the total prevalence of inadequate and problematic levels in all dimensions of HL to be over 60% (28). In a study conducted in Japan to determine HL in individuals with CKD, patients were classified as "limited" with an total HL of 81%, health care HL of 80.5%, disease prevention HL of 64.5% and health promotion HL of 83.5% (29).

In our study, it was found that the HL scores of married and widowed individuals were significantly lower than those of single individuals, and the HL scores of individuals with high school and above education were significantly higher than those of other education levels. Uğurlu et al. found a significant relationship between gender and HL, and the mean score of female on the HL scale was found to be lower than that of male (30). In addition, a statistically significant difference was found between educational level and HL and it was found that university graduates caused this difference (30). In a study conducted in different age groups, it was reported that participants with lower education level had lower HL scores (31). Bezerra et al. associated marital status with inadequate HL levels (32). In line with the information in the literature, it is shown that individual factors can affect HL.

In our study, a statistically significant relationship was found between PA and HL dimensions. In a study conducted in CKD patients, it was shown that HL was significantly and positively associated with self-care behaviors such as diet and exercise (33). A study of older adults found that low HL was associated

with inadequate PA (34). Older people with inadequate HL were 38% less likely to engage in physical activity at least five days a week compared to those with adequate HL (35). A review on HL and PA found a significant positive association between high HL and high PA (36). Therefore, HL should be included in health promotion programs as a factor that improves physical performance.

In the literature, different results were found in studies evaluating the relationship between HL and QOL. In a recent study, a relationship was found between literacy and patients' QOL and it was found that for each additional point obtained in HL, the QOL score increased by 0.78 points (28). In a study on CKD, individuals with high levels of HL were found to have better QOL (37). Contrary to these findings in the literature, no statistically significant relationship was found between HL and QOL in our study. Green et al. did not report a significant relationship between HL and QOL (12). Similarly, Shayan et al. found no association between HL and QOL in diabetic and non-diabetic HD patients (38).

5. Conclusion and Recommendations

In our study, HD patients were found to have problematic HL. Statistical differences were found between HL dimensions and individual characteristics such as age, marital status and educational status. While there was a statistically significant relationship between HL and PA, there was no significant relationship with QOL.

HL level plays a vital role in the management of CKD-related complications. HL needs to be given more importance in these patients. To increase HL, patients' HL levels should be determined and patient-specific education programs should be identified and implemented. A sedentary lifestyle is associated with disease progression and death. PA should be assessed in HD. Future guidelines should provide guidance on individualized physical activity, safety precautions and exercise. Intervention programs to increase HL levels should be developed to maintain and improve patients' QOL. Dialysis nurses who closely care for dialysis patients and physiotherapists who will support increasing physical activity levels should be trained on this subject, and it may be suggested that more audiences can be reached through the effective use of technology in these trainings.

Limitations

The fact that the study was conducted in a single center is among its limitations. Physical activity level was considered based solely on the IPAQ. More objective devices such as pedometer and accelerometer may be used in future studies.

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