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Comparison of Health-promoting Behaviors, Anxiety, and Depression Between Hemodialysis Patients and Healthy Controls During the COVID-19 Pandemic

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Abstract

Background: Patients with Chronic Kidney Disease (CKD) undergoing hemodialysis experience psychological symptoms due to the stressful process and are likely to engage in fewer health-promoting behaviors.
Objectives: This study aimed to compare health-promoting behaviors and psychological distress in hemodialysis patients and healthy individuals during the COVID-19 pandemic.
Methods: This case-control study was conducted on 139 hemodialysis patients who visited the dialysis unit of Shahid Beheshti Hospital in Iran County and 139 healthy controls between 2020 and 2021. A demographic form, the Hospital Anxiety Depression Scale (HADS), the Health Promoting Lifestyle Profile II (HPLPII), and the Coronavirus Anxiety Scale (CAS) were used to collect data. Data analysis was performed in SPSS version 22, and a P-value of less than 0.05 was considered statistically significant.
Results: The mean age of the hemodialysis participants was 56.79 ± 13.97, and that of healthy participants was 56.89 ± 13.87 (P = 0.99). The mean score of health-promoting behaviors was significantly lower in hemodialysis patients than in healthy participants (120.53 ± 20.35 vs. 125.92 ± 6.76) (P = 0.005). Furthermore, hospital anxiety-depression (20.49 ± 5.20 vs. 15.28 ± 2.95) and coronavirus anxiety (22.83 ± 7.19 vs. 20.77 ± 4.71) were significantly higher in hemodialysis patients than in healthy participants (P < 0.001 and P = 0.001, respectively).
Conclusions: Hemodialysis patients exhibited lower health-promoting behaviors and higher coronavirus anxiety and depression than healthy individuals.

Keywords: Renal Dialysis, Kidney Failure, Chronic, Health Behavior, Anxiety, Depression

1. Background

The number of people with Chronic Kidney Disease (CKD) is increasing every year (1), leading to more CKD patients needing Renal Replacement Therapy (RRT) (2). According to Pender's theory, health-promoting behaviors include any measure taken to increase or maintain the level of health and self-actualization in a person or group (3). Health-promoting behaviors consist of six dimensions, namely spiritual growth, health responsibility regarding self and society, interpersonal relations to promote the social dimension of health, stress management to prevent physical and mental illnesses, physical activity, and healthy nutrition to maintain health in daily life (4). Patients on RRT often experience mood disorders and lower quality of life. Quality of life has an inverse relationship with anxiety and depression (5). Lifelong dependence on dialysis therapy, high mortality rates, and patients' adaptability to the condition can cause physical, social, and economic changes besides psychological effects such as depression, anxiety, despair, fatigue, lower quality of life, and a higher suicide rate (6).

Depression is the most important and common

psychiatric disorder in End-stage Renal Disease (ESRD) patients. Dialysis patients' depression not only affects mortality (7), but they also experience a higher rate of hospitalization (8) and withdrawal from dialysis (9). Depression is also associated with lower quality of life and higher cardiovascular complications (10). Suicide ideation or attempt is significantly higher in dialysis patients than in the general population (11). A meta-analysis study reported the point prevalence rate of depression to be 22.8% in CKD patients, which was higher than the depression rate in the general population (12.9%) (12).

Depression is less diagnosed in hemodialysis patients because healthcare providers who provide facilities, treatment, and routine measures for these patients may not pay attention to depression control due to the nature of their disease (13). Regular depression screening must be conducted in this population because both depression and anxiety are strongly associated with the patient's quality of life (14).

Anxiety is a common but often neglected psychiatric symptom in patients with ESRD undergoing hemodialysis (HD) therapy (15). The exact prevalence of anxiety disorders is unclear in hemodialysis patients, but different studies have provided estimates of about 12 to 52% (16). Fear of the unknown has always been anxiety-provoking for humans. The insufficient scientific information about COVID-19 exacerbates this anxiety. During this era, people are looking for more information to overcome their anxiety. Anxiety can make people unable to distinguish between right and wrong, and thus, they may be exposed to false news (17).

2. Objectives

As early screening of anxiety and depression in hemodialysis patients for performing necessary interventions can help improve their quality of life (18), the present study aimed to compare health-promoting behaviors and psychological distress between hemodialysis patients and those without hemodialysis during the COVID-19 pandemic.

3. Methods

This case-control study was conducted on 139 hemodialysis patients who visited a referral teaching hospital in Mazandaran province, Iran, between 2020 and 2021. The inclusion criteria were individuals over the age of 18, physical ability to answer questionnaires, and informed consent. The exclusion criteria were incurable diseases, patient non-cooperation, non-consent, and severe psychiatric disorders. As there was no data on the mean (SD) of the Health Promoting Lifestyle Profile in two groups of participants in the previous study, we used a previous study that assessed depression and anxiety in hemodialysis patients (19). Also, we calculated the sample size of the participants based on the Health Promoting Lifestyle Profile of the patients on a pilot study at the beginning of the study with the following formula:

$$n = \frac{\left(Z_{1-\frac{I}{2}} + Z_{1-I^2}\right)^2 2S^2}{d^2}$$

Where I ±= 0.5; I^2 = 0.20; S = 13; d = 4.5

After inserting the equation, the minimum number of necessary samples was determined to be 139 patients undergoing hemodialysis at Shahid Beheshti Hospital in Babol City. Also, 139 healthy individuals were included in the study using the convenience sampling method.

In this study, the project manager (a medical student) invited patients who met the inclusion criteria and were visiting the dialysis unit to participate. During an interview session with the patients waiting for hemodialysis, the researcher checked their inclusion criteria and invited them to participate if they were eligible. The patient's demographic information was collected after obtaining their consent and completing the informed consent forms. To prevent fatigue in patients and increase the accuracy of data collection, the questionnaires were completed in two consecutive dialysis sessions. In the first session, the Hospital Anxiety Depression Scale (HADS) (14 questions) and the Coronavirus Anxiety Scale (CAS) (18 questions) were completed after an interview to obtain their personal information. In the second session, the Health Promoting Lifestyle Profile II (HPLPII) questionnaire (52 questions) was completed.

For the control group, the researcher went to the nephrology clinic of the same hospital and examined those who were homogeneous with the case group in terms of gender, age, education level, and important underlying diseases (e.g., diabetes, hypertension, hyperlipidemia, and thyroid diseases). Individuals who met the inclusion criteria were invited to participate. The data collection tools for the control group included the HPLPII questionnaire, the HADS, and the CAS.

The HPLPII questionnaire consisted of 52 questions designed by Walker in 1990. This questionnaire measures health responsibility, nutrition, physical activity, stress management, and interpersonal relations on a 4-point Likert scale: "never = 1, sometimes = 2, often = 3, and always = 4". Walker et al. (1990) confirmed the reliability of the lifestyle questionnaire as 0.86, 0.86, 0.8, 0.85,

0.79, and 0.87 for the six scales and 0.94 for the entire questionnaire using Cronbach's alpha (20). The validity and reliability of the questionnaire were also confirmed in Iranian studies. Confirming the construct validity, Pourmidani et al. reported the correlation between the subscales of this questionnaire between 0.67 and 0.80, and Mohammadi Zeidi et al. reported between 0.27 and 0.86. Also, the content validity of this tool has been qualitatively confirmed by Fathi Ashtiani and Jafari Kandovan (21-23). The reliability of this questionnaire has been confirmed in Iranian studies. In Mohammadi Zeidi et al.'s study, the Cronbach's alpha coefficient of the questionnaire for the whole tool was 0.82, and its dimensions were between 0.64 and 0.91, and in Fathi Ashtiani and Jafari Kandovan's study, it was 0.96. mentioned (22, 23).

The HADS was utilized as a tool in this research. This scale was first introduced by Zigmond and Snaith in 1983 as a method for screening psychiatric disorders in public outpatient clinics. The HADS measures depression and anxiety in outpatients simultaneously. The internal consistency of this measurement subscale was indicated by the measurement of Cronbach's alpha for the seven items of the depression subscale (Alpha = 0.70) and seven items of the anxiety subscale (24). Each question on this scale is scored from 0 to 3; hence, the scores of the depression and anxiety subscales range from 0 to 21 in the HADS. Higher scores indicate higher anxiety and depression. The validity of this questionnaire has been confirmed in Iranian studies. In Montazeri's study, assessing the validity by comparing the known groups showed satisfactory results. Both anxiety and depression subscales discriminated well between subgroups of patients who differed in clinical status (25). The face and content validity of the questionnaire has been confirmed by Kaviani et al. (24). The reliability of this questionnaire has been confirmed in Iranian studies. Amini et al. reported 0.866 and 0.735 coefficients, Montazeri et al. calculated 0.78 and 0.86 coefficients, and Kaviani obtained 0.85 and 0.70 coefficients for Cronbach's alpha of anxiety and depression subscales (24-26).

The CAS was another data collection tool used in the present study. Among Iranian researchers, Alipour et al. designed this scale in 2020, and it is scored on a 4-point Likert scale (never = 0, sometimes = 1, often = 2, and always = 3). The minimum and maximum scores for this tool are 0 and 54, respectively. A higher score indicates higher anxiety. The face and content validity of this tool was confirmed qualitatively. The reliability of this tool is 0.879 for the first dimension (psychological), 0.861 for the second dimension (physical), and 0.919 for the entire tool, using Cronbach's alpha method (27).

We used SPSS22 software for data analysis. Descriptive results were displayed in a table (absolute and relative frequency). The Kolmogorov-Smirnov test was utilized to examine the normality of data distribution. All variables in the results had $P > 0.05$, indicating the normality of data distribution. Therefore, parametric tests were used for data analysis. The *t*-tests were utilized to examine the differences in the total mean scores and different scopes of the questionnaires.

The present study was approved by the Ethics Committee of Babol University of Medical Sciences, with the code IR.MUBABOL.REC.1399.296. The researchers explained the purpose of the research to the participants, and they signed informed consent forms. The researchers committed themselves to observing the ethical principles of the Declaration of Helsinki. They guaranteed that the patient's personal information would remain confidential. The researchers also ensured that participation in the study was voluntary and would not affect the patient's care and treatment process. The participants had the right to leave the study. The researchers sought to comply with the principles of the Committee on Publication Ethics (COPE).

4. Results

Two hundred seventy-eight individuals participated in the present study, among whom 139 were assigned to the case group, and 139 were assigned to the control group. All research units were present until the end of the study; hence, there was no drop-out in the sample size.

Of the total participants, 122 were male, and 156 were female. One hundred forty participants were illiterate. Regarding job status, most (N = 145) were housewives. Most of them (N = 228) were married, and the majority (N = 225) lived in the city. The mean age of the control group (56.89 ± 13.87) did not have a significant difference from that of the case group (56.79 ± 13.97) (P = 0.99).

The chi-square test was used to examine the different frequencies of demographic characteristics and medical history between patients undergoing hemodialysis and healthy participants. The results indicated a significant difference between the two groups in terms of job status, marital status, and history of Ischemic Heart Disease (IHD) (Table 1).

Among the 139 patients undergoing hemodialysis, the majority (N = 41) had been undergoing hemodialysis for 2 - 3 years. Moreover, 91.4% of the patients underwent hemodialysis three times a week, and 92 (66.2%) underwent hemodialysis for four hours each time. Hypertension was the leading cause of hemodialysis (55.4%) (Table 2).

Table 1. Frequency of Demographic Characteristics and Medical History of the Participants

Variables	Healthy Individuals	Hemodialysis Patients	P-Value
Gender			0.18
Male	55 (39.6)	67 (48.2)	
Female	84 (60.4)	72 (51.8)	
Education level			0.86
Illiterate	71 (51.1)	69 (49.6)	
Primary school	35 (25.2)	31 (22.3)	
High school diploma	21 (15.1)	25 (18.0)	
Higher than diploma	12 (8.6)	14 (10.1)	
Job			0.003
Employee	10 (7.2)	9 (6.5)	
Self-employed	30 (21.6)	23 (16.5)	
Farmer	0 (0)	6 (4.3)	
Unemployed	15 (10.8)	30 (21.6)	
Housewife	82 (59.0)	63 (45.3)	
Other	2 (1.4)	8 (5.8)	
Marital status			0.001
Single	8 (5.8)	12 (8.6)	
Married	108 (77.7)	120 (86.3)	
Divorced	1 (0.7)	4 (2.9)	
Widowed	22 (15.8)	3 (2.2)	
Place of residence			0.36
City	116 (83.5)	109 (78.4)	
Village	23 (16.5)	30 (21.6)	
History of visiting a psychiatrist			0.06
Yes	2 (1.4)	9 (6.5)	
No	137 (98.6)	130 (93.5)	
History of psychiatric disease			0.99
Yes	2 (1.4)	3 (2.2)	
No	137 (98.6)	136 (97.8)	
History of using psychiatric drugs			0.99
Yes	6 (4.3)	5 (3.6)	
No	133 (95.7)	134 (96.4)	
History of addiction			0.49
Cigarette	7 (5.0)	6 (4.3)	
Opioids	5 (3.6)	2 (1.4)	
No history	127 (91.4)	131 (94.2)	
History of ischemic heart disease			<0.001
Yes	24 (17.3)	59 (42.4)	
No	115 (82.7)	80 (57.6)	
History of hyperlipidemia			0.30
Yes	38 (27.3)	47 (33.8)	
No	101 (72.7)	92 (66.2)	
History of hypertension			0.28
Yes	98 (70.5)	107 (77.0)	
No	41 (29.5)	32 (23.0)	
History of diabetes			0.54
Yes	51 (36.7)	57 (41.0)	
No	88 (63.3)	82 (59.0)	
History of thyroid disease			0.13
Yes	16 (11.5)	26 (18.7)	
No	123 (88.5)	113 (81.3)	

Table 2. Frequency of Dialysis Features in Hemodialysis Participants

Variables	Frequency (%)
History of dialysis, y	
≤ 1	36 (25.9)
2 - 3	41 (29.5)
4 - 6	31 (22.3)
≥ 7	31 (22.3)
Dialysis frequency per week	
Once	1 (0.7)
Twice	11 (7.9)
Three times	127 (91.4)
Dialysis duration in each session, h	
3	47 (33.8)
4	92 (66.2)
Cause of dialysis	
Hypertension	77 (55.4)
Diabetes	38 (27.3)
Polycystic kidney	5 (3.6)
Kidney failure	12 (8.6)
Kidney stone	1 (0.7)
Hydronephrosis	2 (1.4)
Kidney infection	2 (1.4)
Alport syndrome	1 (0.7)
Lupus	1 (0.7)

The two groups differed significantly in terms of the total scores of all questionnaires, and they were also significantly different in all fields, except for interpersonal relations and nutrition in the HPLP questionnaire. In other words, the healthy individuals showed significantly more health-promoting behaviors, and the hemodialysis patients showed more hospital anxiety-stress and coronavirus anxiety (Table 3).

5. Discussion

The present study aimed to determine the status of health-promoting behaviors in hemodialysis patients and their association with psychological distress during the COVID-19 pandemic.

According to our findings, the mean score of the HPLPII questionnaire was 120.53 ± 20.35 in hemodialysis patients. Health-promoting behaviors were weaker in dialysis patients than in the control group. They also had lower scores in spiritual growth, stress management, and physical activity but higher scores in health responsibility than the control group. Sarıaslan and Kavurmacı (28) reported that the mean score of health-promoting behaviors was 117.80 ± 37.07 in dialysis patients, which was partially similar to our study. Like our study, sports and physical activity received the lowest score among the health-promoting components. However, Özkaraman et al. (29) reported the mean scores of health-promoting behaviors to be 137.34 ± 35.38, which was higher than in our study. Like the present study, the lowest score of health-promoting behavior belonged to exercise and physical activity in these studies. Given the lower level of health-promoting behaviors in hemodialysis patients, previous studies have examined different behaviors to promote health in dialysis patients, including exercise and physical activity during dialysis and educational programs to increase patients' knowledge. Such programs can significantly promote health behaviors in patients with kidney problems (30).

According to our findings, hemodialysis patients had significantly higher depression scores than the control group. Like our study, Amani Anwar et al. (31) evaluated the depression and anxiety of dialysis patients using the HADS in Jordan. In their study, the mean score for depression was 8.74, which was lower than that in our study. Lifelong dialysis treatment at least three times a week, excessive medication by patients at one time, the economic burden on patients and their families, and changes in family and social relationships are probably among the causes of higher depression in dialysis patients (32).

The case group had anxiety higher than the control group in the present study. Anxiety disorders are common psychiatric disorders that often exist in patients with kidney failure undergoing dialysis (33). Ok and Kutlu (34) found that the patients' mean anxiety score was 4.72 based on the HADS, which differs greatly from our study.

According to our findings, hemodialysis patients had significantly higher coronavirus anxiety than the control group. Consistent with our study, Shi et al. (35) indicated that dialysis patients had higher anxiety during COVID-19. According to a study by Dehghan et al. (36) in Kerman province, the mean anxiety score of dialysis patients was 12.03, which was lower than our study. They also found that 30% of patients had moderate to severe anxiety. It was also mentioned that this higher anxiety in the COVID-19 era could be due to the worry of contracting COVID-19 and its various complications in dialysis patients because of their higher vulnerability.

The present study had limitations. First, the small number of research units decreased the research generalizability. Second, the subjective nature of the questionnaires was not as accurate as the specific psychiatric interview; third, the cross-sectional nature of the study could not determine the cause-effect relationship.

Table 3. Comparison of the Mean Scores of the Psychological Questionnaires and Their Different Domains in Control (Without Hemodialysis) and Case Groups (with Hemodialysis) [a]

Variables	Healthy Individuals	Hemodialysis Patients	P-Value
HPLPII			
Spiritual growth	22.55 ± 2.58	20.48 ± 4.41	<0.001
Health responsibility	21.45 ± 3.31	22.96 ± 4.61	0.002
Interpersonal relations	23.73 ± 2.71	23.09 ± 4.57	0.16
Stress management	18.22 ± 2.34	16.70 ± 3.51	<0.001
Physical activity	16.91 ± 2.98	14.86 ± 4.86	<0.001
Nutrition	23.07 ± 2.90	22.45 ± 4.38	0.11
Total	125.92 ± 6.76	120.53 ± 20.35	0.005
Coronavirus Anxiety Scale (CAS)	20.77 ± 4.71	22.83 ± 7.19	0.001
HADS			
Anxiety	7.89 ± 2.17	10.15 ± 3.28	<0.001
Depression	7.39 ± 2.16	10.34 ± 2.82	<0.001
Total	15.28 ± 2.95	20.49 ± 5.20	<0.001

Abbreviations: HPLPII, Health-promoting Lifestyle Profile II; HADS, Hospital Anxiety Depression Scale.
[a] Values are expressed as Mean ± SD.

5.1. Conclusions

Our findings indicate that hemodialysis patients have lower scores for health-promoting behaviors and higher levels of hospital depression-anxiety and coronavirus anxiety compared to the control group. Planning and implementing health-promoting projects is necessary for dialysis patients to promote health-promoting behaviors and reduce their anxiety and depression. We suggest that other researchers conduct similar studies with a larger number of samples to investigate different strategies and improve anxiety, depression, and health-promoting behaviors in dialysis patients.

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Footnotes

Authors' Contribution: R.A. and M. F. designed the project. M.B. collected data. R.G. conducted the project. H. G. analyzed the data. S.A.S. wrote the primary draft of the manuscript. M.F. and R. A. revised the primary draft. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to the Ethics Committee principles.

Ethical Approval: This study is approved under the ethical approval code of IR.MUBABOL.REC.1399.296.

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