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Original Article

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Association Between Perceived Stress with Anxiety, Depression, and Resilience in Hemodialysis Patients During Coronavirus Disease 2019 Pandemic

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ABSTRACT

Background: Research has revealed heightened levels of anxiety, depression, and stress in various groups during the coronavirus disease 2019 (COVID-19) pandemic. Nevertheless, the influence of the pandemic on the mental well-being of individuals undergoing dialysis has yet to be fully understood. The aim of this study was to investigate the association between perceived stress (PS) with anxiety, depression, and resilience in hemodialysis patients during COVID-19 pandemic.
Methods: The study population consisted of consecutive 53 hemodialysis patients. The sociodemographic form, PS scale, hospital anxiety depression scale (HADS), and resilience scale were applied to all participants.
Results: The mean age of the study population was 64.7 ± 12.8 years. Twenty-eight (52.8%) of patients were male. The PS score was significantly correlated with HADS-Anxiety (A) score, HADS-Depression (D) score, and total resilience score. Patients with a PS score ≥25 were accepted as the high PS score group. Thirty-four patients (64.2%) had a high PS score. The number of illiterate patients and patients living with a nuclear family were more common in patients with a high PS score. HADS-A score and HADS-D score were significantly higher in patients with a high PS score. Multivariate logistic regression analysis demonstrated that among the total resilience score, HADS-A score, HADS-D score, age, education status, and family status, only HADS-A score was an independent predictor of a high PS score.
Conclusion: The PS score was significantly correlated with HADS-A score, HADS-D score, and total resilience score. The HADS-A score was an independent predictor of a high PS score. Clinicians should pay more attention to the evaluation of psychiatric symptoms in hemodialysis patients due to devastating consequences of the COVID-19 pandemic.
Keywords: Perceived stress, resilience, anxiety, depression, COVID-19 pandemic

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INTRODUCTION

Chronic kidney disease (CKD) presents a significant global public health concern, impacting millions of individuals across the world and imposing considerable physical, psychological, and societal hardships.[1] Among CKD patients, those undergoing hemodialysis (HD) constitute a particularly vulnerable population.[2] Hemodialysis, while life-sustaining, demands a rigorous and unrelenting regimen of medical interventions, dietary restrictions, and lifestyle modifications.[3,4] The profound disruptions caused by the COVID-19 pandemic have further compounded the complex psychosocial landscape experienced by these patients.[5]

Perceived stress arises when individuals perceive their interaction with the environment as burdensome or potentially harmful, with the potential to impact their overall well-being.[6] This feeling of stress is often marked by a sense of confusion or unease as individuals attempt to evaluate the level of threat associated with a stressful situation, leading to emotions such as tension and a perceived loss of control.[7] Its relevance in the context of

chronic illness, particularly during times of global crisis, underscores the need for comprehensive investigation.

Many psychiatric disorders are observed in HD patients, such as depression and anxiety.[8] Anxiety and depression can exacerbate the already burdensome emotional turmoil associated with chronic illness. Understanding how perceived stress levels correlate with these psychiatric outcomes can inform tailored interventions to alleviate suffering and enhance the quality of life for HD patients.

Resilience encompasses the capacity of an individual or a collective to adjust and preserve their mental well-being when confronted with challenging situations or adverse events.[9] Resilient adaptation is commonly observed following exposure to trauma, traumatic disasters, and even in the midst of a pandemic.[10] Vulnerable groups, particularly individuals with chronic medical conditions, are deemed to be at a high risk of experiencing stress during the COVID-19 pandemic. Resilient trajectories are not typically anticipated as the norm among this demographic.[11] García-Martínez et al. have verified that resilience stands as a significant predictor of perceived stress.[12] Acknowledging the significance of resilience in the mental health context of HD patients, particularly during the pandemic, is crucial for the development of comprehensive and successful psychiatric interventions.

In this article, we aim to evaluate the association between perceived stress, anxiety, depression, and resilience in HD patients during the COVID-19 pandemic, offering a comprehensive psychiatric perspective.

MATERIAL AND METHODS

Study Population

The Ethics Committee of Health Sciences University granted approval for all research procedures, aligning with the principles of the Helsinki Declaration (approval date: June 17, 2020; no. 1236). Prior to participating, participants provided written consent after receiving comprehensive information. In this cross-sectional study, 53 HD patients in a commercial dialysis unit between July 1, 2020, and October 1, 2020, were enrolled. Power analyses were performed by an online calculator (https ://clincalc.com/stats/samplesize.aspx). Assuming a power of 90% and α = 0.05, a study population including at least 53 individuals was needed. Inclusion criteria were duration of HD more than 6 months, age over 18 years old, ability to respond to questionnaires, and volunteering to participate in the study by signing the informed consent. The sociodemographic form, PS scale, hospital anxiety depression scale (HADS), and resilience scale were applied to all participants.

Perceived Stress Scale

In 1983, the perceived stress scale was developed by Cohen et al.[7] This scale consists of 14 items. It measures how unpredictable, uncontrollable, and overloaded the participants' lives were during a month. Individuals assess each item using a 5-point Likert-style scale, spanning from "Rarely (0)" to "Frequently (4)." Seven items featuring affirmative statements are evaluated in the opposite direction. The scores of the PS scale-14 vary between 0 and 56. Higher scores represent higher levels of PS. The Turkish reliability and validity of the scale were established.[13]

The Hospital Anxiety and Depression Scale

This scale is used to determine the depressive and anxiety symptoms.[14] It consists of 14 questions, with 7 items measuring the severity of depression (HAD-D), and 7 items measuring the severity of anxiety (HADS-A). HADS-D primarily encompasses fundamental depressive symptoms like anhedonia and reduced interest. HADS-A predominantly addresses central anxiety aspects such as concern and unease. The Turkish adaptation of HADS has demonstrated reliability and validity within Turkish patients. The threshold for the anxiety subscale score is reported as 10, while for the depression subscale score, it is 7.[15]

Resilience Scale

Friborg et al. formulated the 33-item resilience scale to gauge resilience levels.[16] This self-report tool appraises 6 safeguarding facets of resilience in adults: Self-Perception, Future Planning, Social Aptitude, Family Unity, Social Support, and Organized Approach. Employing a Likert-style format, it accommodates diverse age brackets and various situations. In the scale, items numbered 1, 3, 4, 8, 11, 12, 13, 14, 15, 16, 23, 24, 25, 27, 31, and 33 are scored in reverse. Higher scores indicate higher resilience. A value of ≥25 was accepted as a high resilience score.[17] The Turkish validity and reliability of the scale were established.[18]

Statistical Analysis

Statistical analyses were conducted using the SPSS 20.0 software package (IBM SPSS Corp.; Armonk, NY, USA) for Windows. Mean ± standard deviation was used to express continuous data, whereas categorical data were portrayed as percentages. To compare categorical variables, the chi-square test was employed, while the student *t*-test or the Mann–Whitney *U* test was used for parametric and nonparametric continuous variables, respectively. The Kolmogorov–Smirnov test was utilized to evaluate normal distribution. Correlation assessment was conducted through either Pearson's or Spearman's correlation

MAIN POINTS

- Perceived stress score is associated with HADS-A score, HADS-D score, and total resilience score.
- HADS-A score is an independent predictor of a high perceived stress score.
- Psychiatric symptoms in hemodialysis patients are important due to the devastating consequences of the coronavirus disease 2019pandemic.

test. Logistic regression analysis was employed to showcase predictors of elevated PS scores. A significance level of $P < .05$ was adopted for statistical significance.

RESULTS

The study population consisted of 53 HD patients. Baseline characteristics and clinical data are shown in Table 1. The mean age of the study population was 64.7 ± 12.8 years. Of the patients, 25 were female, and 28 were male. Smoking was reported by 15.1% of patients, while 3.8% reported alcohol consumption.

Table 1. Baseline Characteristics and Clinical Data of the Study Population

Age (years ± SD)	64.7 ± 12.8
Sex (male, n %)	28 (52.8)
Smoking (n, %)	8 (15.1)
Use of Alcohol (n, %)	2 (3.8)
Perceived stress score	26.4 ± 6.8
Hospital anxiety and depression scale ± SD–Anxiety	6.6 ± 4.1
Hospital anxiety and depression scale ± SD–Depression	6.7 ± 3.8
Body mass index (kg/m^2 ± SD)	26.3 ± 6.2
Duration of hemodialysis(years ± SD)	7.4 ± 7.5
Duration of chronic kidney disease (years ± SD)	11.6 ± 7.5
Marital status (n, %)	
Single	16 (30.2)
Married	37 (69.8)
Education status (n, %)	
illiterate	13 (24.5)
Literate	40 (75.5)
Economic status (n, %)	
Low	9 (17.0)
Middle/high	44 (83.0)
Occupation (n, %)	6 (11.3)
Family status (n, %)	
Core family	40 (75.5)
Extended family	13 (24.5)
History of kidney transplantation (n, %)	4 (7.5)
History of peritoneal dialysis (n,%)	3 (5.7)
Dialysis access problem (n, %)	21 (39.6)
Dialysis access site (n, %)	
Arteriovenous fistula (n, %)	41 (77.4)
Catheter (n, %)	12 (22.6)
History of COVID-19 infection (n, %)	1 (1.9)

Table 2. Resilience Parameters of the Study Population (years ± SD)

Structured stile	13.9 ± 4.0
Planned future	13.9 ± 4.7
Family cohesion	24.1 ± 5.3
Perception of the self	23.4 ± 5.3
Social competence	23.5 ± 6.2
Social resources	29.1 ± 4.3
Total resilience score	127.1 ± 20.2

The mean PS score of the study population was 26.4 ± 6.8. The mean HADS score was 6.6 ± 4.1 for anxiety and 6.7 ± 3.8 for depression. According to the HAD scales, 11 patients (20.8%) had anxiety, and 26 patients (49.1%) had depression. Resilience parameters of the study population are shown in Table 2. The mean total resilience score of the study population was 127.1 ± 20.2.

Patients were divided into 2 groups according to PS score. Patients with a PS score ≥25 were considered as the high PS score group. While 34 patients had a high PS score, 19 patients

Table 3. Comparison of Baseline Characteristics and Clinical Data According to Perceived Stress (PS) Score

	Low PS Score (n = 19)	High PS Score (n = 34)	*P*
Age (years ± SD)	60.6 ± 13.3	66.9 ± 12.2	.112
Sex (male n, %)	12 (63.2)	16 (47.1)	.390
Smoking (n, %)	4 (21.1)	4 (11.8)	.436
Alcohol (n, %)	1 (5.3)	1 (2.9)	.593
Total resilience score ± SD	134.1 ± 15.9	123.2 ± 21.5	.060
HADS-Anxiety ± SD	3.5 ± 2.3	8.4 ± 3.9	**<.001**
HADS-Depression ± SD	4.4 ± 2.6	8.0 ± 3.8	**.001**
Body mass index (kg/m^2 ± SD)	26.3 ± 9.2	26.2 ± 3.8	.368
Duration of hemodialysis (years ± SD)	7.0 ± 8.1	7.6 ± 7.2	.703
Marital status (single, n, %)	8 (42.1)	8 (23.5)	.158
Education status (illiterate, n, %)	1 (5.3)	12 (35.3)	**.019**
Economic status (low, n, %)	2 (10.5)	7 (20.6)	.463
Working status (n, %)	3 (15.8)	3 (8.8)	.655
Family status (Core family, n, %)	11 (57.9)	29 (85.3)	**.044**
History of peritoneal dialysis (n, %)	0 (0)	3 (5.7)	.545
Dialysis access problem (n, %)	5 (26.3)	16 (47.1)	.158
Dialysis access site (catheter n, %)	2 (10.5)	10 (29.4)	.174

Values in bold indicate statistical significance.
HADS, hospital anxiety depression scale; SD, standard deviation.

Table 4. Correlation Analysis Between Perceived Stress with HAD Scales and Resilience

	Perceived Stress	HADS-A	HADS-D	Total Resilience
Perceived stress	–	$r = 0.713$ P **< .001**	$r = 0.550$ $P < .001$	$r = -0.379$ **P = .005**
HADS-A	$r = 0.713$ P **< 0.001**	–	$r = 0.709$ P **< .001**	$r = -0.591$ P **< .001**
HADS-D	$r = 0.550$ P **< .001**	$r = 0.709$ P **< .001**	–	$r = -0.583$ P **< .001**
Total Resilience	$r = -0.379$ P **= .005**	$r = -0.591$ P **< .001**	$r = -0.583$ P **< .001**	–

Values in bold indicate statistical significance.
HADS-A, The Hospital Anxiety and Depression Scale for Anxiety; HADS-D**,** The Hospital Anxiety and Depression Scale for Depression.

Table 5. Logistic Regression Analysis to Determine Predictors of High PS Score

	Odds Ratio	95% CI	*P*
Total resilience score	1.044	0.987-1.105	.134
HADS-Anxiety score	1.941	1.163-3.240	**.011**
HADS-Depression score	1.031	0.743-1.431	.854
Age	1.068	0.986-1.157	.105
Education status (illiterate)	2.814	0.177-44.747	.464
Family status (corefamily)	6.439	0.683-60.723	.104

The value in bold indicates statistical significance.
PS, perceived stress; HADS, Hospital Anxiety Depression Scale.

had a low PS score. A comparison of baseline characteristics and clinical data according to PS score is shown in Table 3. Age and sex were similar between groups. illiterate patients were more common in patients with a high PS score. Most patients (85.3%) in the high PS score group were members of a nuclear family. HADS-A score and HADS-D score were significantly higher in patients with a high PS score compared to those with a low PS score.

Correlation analysis between PS score, HAD scales, and total resilience score is shown in Table 4. The PS score was significantly correlated with HADS-A score, HADS-D score, and total resilience score.

Multivariate logistic regression analysis was performed to determine the predictors of a high PS score (Table 5). Among total resilience score, HADS-A score, HADS-D score, age, education status, and family status, only the HADS-A score was an independent predictor of a high PS score.

DISCUSSION

Since the outbreak of the pandemic, experts have pointed out its potential implications for mental health, stemming not only from the disease itself but primarily from significant changes in lifestyle and social changes brought about by rigorous sanitary policies, such as quarantine, aimed at containing the spread of the disease.[19] Recent studies have demonstrated a close relationship between these precautionary policies with psychological distress, leading to increased anxiety and stress levels during the COVID-19 pandemic.[20,21]

Recent studies have demonstrated that the prevalence of depression and anxiety was around 20% during the COVID-19 pandemic period in the general population.[22,23] In our study, almost 20% of patients had anxiety, and 50% of patients had depression. Clinicians should pay more attention to patients with chronic conditions due to the devastating consequences of the COVID-19 pandemic, which may increase the PS level.[20,24] In our study population, 64% of HD patients had a high PS score.

Previous studies have demonstrated that an increased PS score is associated with deteriorated health conditions and elevated levels of depression and anxiety in patients with chronic diseases.[21] Consistent with these findings, HADS-A and HADS-D scores were significantly higher in patients with a high PS score compared to those with a low PS score in our study. Considering these findings, timely diagnosis and treatment of psychiatric disorders are important to prevent the negative effects of increased PS score on patient outcome.

In a study conducted by Nadort et al., they examined the levels of perceived stress, depression symptoms, and anxiety symptoms among HD patients in the Netherlands during the initial and subsequent waves of the COVID-19 pandemic. Their findings indicated that the pandemic itself did not exert a significant impact on the mental well-being of this patient group.[25] However, it is worth noting that individuals who had previously encountered mental health challenges might have displayed an elevated vulnerability to stress associated with COVID-19. Similarly, Bonenkamp et al. also noted that the psychological well-being of dialysis patients appeared to remain stable despite the COVID-19 pandemic.[26] The researchers proposed that this resilience could be attributed to their strong psychological fortitude and reduced susceptibility to the adverse consequences of social distancing and isolation measures.

In our study, correlation findings underscore the complex interplay between perceived stress, anxiety, depression, and resilience in hemodialysis patients during the COVID-19 pandemic. They suggest that interventions aimed at reducing stress and improving resilience may have a positive impact on the mental well-being of these patients. Additionally, addressing comorbid anxiety and depression may be essential in enhancing overall resilience and psychological outcomes. Overall, these results

contribute to our understanding of the psychosocial challenges faced by hemodialysis patients and may inform targeted interventions to support their mental health.

The logistic regression analysis identifies HADS-Anxiety scores as a statistically significant predictor of high PS scores, indicating that higher anxiety levels are associated with an increased likelihood of experiencing high perceived stress. This finding is consistent with other studies investigating stress and anxiety in hemodialysis patients.[27] These findings emphasize the central role of anxiety in understanding and addressing perceived stress levels among hemodialysis patients during the COVID-19 pandemic. To understand how these predictors compare to a healthy control group, a similar analysis should be conducted on data collected from healthy controls.

Study Limitations

The study exhibits several limitations. First, the sample size was limited, potentially influencing the robustness of correlation analyses. Secondly, our study design was cross-sectional, carrying inherent limitations. The cross-sectional approach precludes drawing definitive conclusions about the clinical efficacy of the suggested questionnaires. The lack of a control group is another limitation. Lastly, patient follow-up was not conducted. By tracking patients over a specific period, valuable prognostic insights about the study population could have been acquired.

In conclusion, the current study showed that PS score was significantly correlated with HADS-A score, HADS-D score, and total resilience score. Moreover, HADS-A score was an independent predictor of high PS score. Clinicians should pay more attention to the evaluation of psychiatric symptoms in HD patients due to devastating consequences of the COVID-19 pandemic, which may affect the PS.

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

Ethics Committee Approval: Ethics committee approval was received from the Ethics Committee of Health Sciences University (Approval Date: June 17, 2020).

Informed Consent: Written informed consent was obtained from patients who agreed to take part in the study.

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REFERENCES

1. Ozturk S, Turgutalp K, Arici M, et al. Mortality analysis of COVID-19 infection in chronic kidney disease, hemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey. *Nephrol Dial Transplant*. 2020;35(12):2083-2095. [CrossRef]
2. *National Nephrology, Dialysis and Transplantation Registry Report of Turkey*; 2019. http://www.nefroloji.org.tr/folders/file/registry_2019.pdf
3. Christensen AJ, Ehlers SL. Psychological factors in end-stage renal disease: an emerging context for behavioral medicine research. *J Consult Clin Psychol*. 2002;70(3):712-724. [CrossRef]
4. Kimmel PL. Depression in patients with chronic renal disease: what we know and what we need to know. *J Psychosom Res*. 2002;53(4):951-956. [CrossRef]
5. Bonenkamp AA, Druiventak TA, van Eck van der Sluijs A, et al. The Impact of COVID-19 on the mental health of dialysis patients. *J Nephrol*. 2021;34(2):337-344. [CrossRef]
6. Lazarus RS. *Stress and Emotion: A New Synthesis*. New York (NY): Springer Publishing Company; 2006.
7. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385-396. [CrossRef]
8. Senkal Z, Sayar K, Kaptanogulları OH, et al. Depression and quality f life in hemodialysis and predialysis patients in a sample from Turkey. *Int J Acad Res*. 2006;8:1.
9. Kalisch R, Baker DG, Basten U, et al. The resilience framework as a strategy to combat stress-related disorders. *Nat Hum Behav*. 2017;1(11):784-790. [CrossRef]
10. PeConga EK, Gauthier GM, Holloway A, et al. Resilience is spreading: mental health within the COVID-19 pandemic. *Psychol Trauma*. 2020;12(suppl 1):S47-S48. [CrossRef]
11. World Health Organization. Disability considerations during the COVID19 outbreak. *Bangladesh Physiother J*. 2020;10(1). [CrossRef]
12. García-Martínez P, Ballester-Arnal R, Gandhi-Morar K, et al. Perceived stress in relation to quality of life and resilience in patients with advanced chronic kidney disease undergoing hemodialysis. *Int J Environ Res Public Health*. 2021;18(2):536. [CrossRef]
13. Eskin M, Harlak H, Demirkıran F, Dereboy Ç. Algılanan Stres Ölçeğinin Türkçeye Uyarlanması: Güvenirlik ve Geçerlik analizi. *New/Yeni Symp J*. 2013;51(3):132-140.
14. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale-an updated literature review. *J Psychosom Res*. 2002;52(2):69-77. [CrossRef]
15. Aydemir O, Guvenir T, Kuey L, Kultur S. Hastane Anksiyete ve Depresyon Olcegi Turkce Formu'nun gecerlilik ve guvenilirligi. *Turk Psikiyatr Derg*. 1997;8:280-287.
16. Friborg O, Hjemdal O, Rosenvinge JH, Martinussen M. A new rating scale for adult resilience: what are the central protective resources behind healthy adjustment? *Int J Methods Psychiatr Res*. 2003;12(2):65-76. [CrossRef]
17. Eskin MPD. *Reports from the Department of Psychology Stockholm University: Introducing a Swedish version of an instrument measuring mental stress*. Stockholm: Stockholm University; 1996.
18. Basım HN, Çetin F. The reliability and validity of the resilience scale for Adults-Turkish version. *Turk Psikiyatri Derg*. 2011; 22(2):104-114.

19. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*. 2020;395(10227):912-920. [CrossRef]
20. World Health Organization. *Disability considerations during the COVID-19 outbreak*; 2020. Available at: https://www.who.int/who-documents-detail/disability-considerations-during-the-covid-19-Outbreak
21. Umucu E, Lee B. Examining the impact of COVID-19 on stress and coping strategies in individuals with disabilities and chronic conditions. *Rehabil Psychol*. 2020;65(3):193-198. [CrossRef]
22. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729. [CrossRef]
23. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun*. 2020;88:901-907. [CrossRef]
24. Berger ZD, Evans NG, Phelan AL, Silverman RD. Covid-19: control measures must be equitable and inclusive. *BMJ*. 2020;368:m1141. [CrossRef]
25. Nadort E, Rijkers N, Schouten RW, et al. Depression, anxiety and quality of life of hemodialysis patients before and during the COVID-19 pandemic. *J Psychosom Res*. 2022;158:110917. [CrossRef]
26. Bonenkamp AA, Druiventak TA, van Eck van der Sluijs A, et al. The Impact of COVID-19 on the mental health of dialysis patients. *J Nephrol*. 2021;34(2):337-344.
27. Lin YJ, Lu KC, Chen CM, Chang CC. The effects of music as therapy on the overall well-being of elderly patients on maintenance hemodialysis. *Biol Res Nurs*. 2012;14(3):277-285. [CrossRef]