


## RESEARCH ARTICLE

# The relationship between anxiety, stress, spiritual health, and mindfulness among patients undergoing hemodialysis: A survey during the COVID-19 outbreak in Southeast Iran

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## Abstract

**Background and aims:** Hemodialysis patients are prone to high stress and anxiety related to the acute coronavirus epidemic. Mindfulness and spiritual health are among the factors associated with stressful and anxious situations. The current study aimed to investigate the relationship between mindfulness, spiritual health, and coronavirus stress/anxiety in patients undergoing hemodialysis.

**Methods:** One hundred and forty-four patients underwent hemodialysis participated in this cross-sectional study. Patients completed the Demographic and Clinical Characteristics Form, Corona Disease Anxiety Scale (CDAS), stress subscale of DASS-21, The Freiburg Mindfulness Inventory- Short Form (FMI-SF), and Spiritual Health Scale.

**Results:** The results showed that 28.5% of the participants had moderate to severe anxiety. According to the psychological symptom subscale (CDAS), 54.2% of the participants had moderate to severe anxiety. According to the physical symptom subscale, 41.7% of the participants had moderate to severe anxiety. Sixteen percent of the patients believed that the coronavirus disease 2019 (COVID-19) outbreak and lockdown influenced their course of treatment. A significant association was found between coronavirus disease anxiety and mindfulness ( $r = -0.20, P < .05$ ). No significant association was found between stress and mindfulness/spiritual health ( $P > .05$ ).

**Conclusion:** The results of this study showed that coronavirus anxiety and stress are common in hemodialysis patients. Mindfulness may be effective in reducing coronavirus anxiety in hemodialysis patients. Therefore, interventions are suggested to increase the level of mindfulness and empower hemodialysis patients to cope with anxiety caused by crises such as the coronavirus outbreak.

## KEYWORDS

anxiety, COVID-19, hemodialysis, mindfulness, stress

**Abbreviations:** CDAS, coronavirus disease anxiety scale; COVID-19, coronavirus; DASS, depression anxiety stress scale; ESRD, end-stage renal disease; FMI-SF, Freiburg mindfulness inventory-short form; HADS, hospital anxiety and depression scale; MBSR, mindfulness-based stress reduction; WHO, World Health Organization.

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## 1 | BACKGROUND

Coronavirus disease 2019 (COVID-19) was detected in China at the end of 2019 and quickly became a pandemic in the world.<sup>1</sup> This disease has had various destructive effects on mental health in China and the world. During the initial phase of the COVID-19 outbreak in China, more than half of the respondents rated the psychological impact as moderate to severe, and about one-third reported moderate-to-severe anxiety.<sup>2</sup> It had the highest Impact of Event Scale-Revised (IES-R), stress, anxiety, and depression scores in some nations, such as Thailand.<sup>3</sup> Furthermore, Poland and the Philippines were the two countries with the highest levels of anxiety, depression, and stress.<sup>4</sup> Some studies have reported numerous mental disorders due to the prevalence of COVID-19 disease and the effects of quarantine in the community.<sup>5</sup> In Iran, high levels of anxiety, stress,<sup>6</sup> and fear have been reported.<sup>7</sup>

According to the World Health Organization (WHO) on April 27, 2020, 109 577 laboratory-confirmed COVID-19 incidents, which included 3809 deaths, were widely reported in China and 28 673 incidents in 104 other countries.<sup>8</sup> Less than half of the patients had underlying diseases such as diabetes, hypertension, and cardiovascular disease.<sup>1</sup> One of the underlying diseases is chronic kidney disease and chronic end-stage failure, which seems to be associated with an increased mortality rate in these patients during coronavirus outbreak.<sup>9</sup> COVID-19 disease has had significant effects on chronic patients, including rheumatoid arthritis, systemic lupus erythematosus,<sup>10</sup> and renal patients.<sup>11</sup> End-stage renal disease (ESRD) is a clinical condition in which the kidneys fail to perform metabolic functions and maintain fluid and electrolyte balance in the body. The ESRD is a common physical disease that affects 2% to 3% of the global population. Patients need alternative therapies, including dialysis, to survive. Hemodialysis is currently the most common alternative treatment for these patients.<sup>12</sup>

A high percentage of stress and anxiety is reported in chronic patients.<sup>13</sup> In addition to chronic disease, hemodialysis patients face many stressors, including problems with treatment, dietary and fluid restrictions, weakness, anxiety, and depression.<sup>14</sup> Stress is associated with all psychological factors and increases the rates of depression, anxiety, and other forms of mental disorders in different patients. Anxiety and stress can physiologically affect the functioning of the immune system and predispose a person to any physical or mental illness by reducing the body resistance.<sup>15</sup> Unfortunately, the prevalence of depression, anxiety, and stress in patients undergoing hemodialysis is currently increasing, which can affect the mental and physical health of these people and also disrupt their course of treatment.<sup>16</sup> Thus, stress and anxiety can weaken the immune system and make a person vulnerable to diseases such as coronavirus. COVID-19 anxiety is common because people do not know such a disease well, and they are worried about the future.<sup>17,18</sup> Mindfulness-based cognitive therapy and spiritual health can be used to improve stress and anxiety.<sup>19</sup>

Mindfulness is limited to the present moment without judgment and requires alertness, constant concentration, and openness of mind. Mindfulness will lead to nonpainful insights because fully conscious experiences will lead to stable acquisition of basic experiences.<sup>20</sup>

Mindfulness, instead of intensifying various pressures and stresses, predisposes to psychological growth, well-being, and health in people and is a way to live better, relieve pain, enrich, and make life meaningful and reduce stress in the short and long term.<sup>21</sup> Thus, mindfulness is a balanced mental framework that avoids emotional and unpleasant magnifications and provides an opportunity to keep one away from emotionally unpleasant states.<sup>21</sup>

Spirituality is another human capability that offers problem-solving and coping strategies. In addition, spirituality as a source of social support creates a meaningful sense of coping with confusion and natural disasters and increases a sense of indirect control over events.<sup>22</sup> Many physicians today consider faith and spirituality an important source of physical health, so they pay attention to patients' spiritual issues in the course of treatment.<sup>23</sup> Spiritual health can be defined as a sense of communication with others, a perception of the meaning and purpose of life, and a connection to a higher power that helps people live better and have more effective interactions with the world around them.<sup>24</sup> This dimension is one of the four dimensions of health. In addition to the physical, mental, and social dimensions, spiritual health promotes public health and coordinates other dimensions of health.<sup>25</sup> Spirituality, a common strategy in coping with problems and diseases, has many roles and effects on the mental and physical health of people.<sup>26</sup> Concerning the effect of spiritual health and mindfulness on promoting adaptation to chronic diseases, COVID-19 stress and anxiety, and the limitations of such studies on dialysis patients, the present study aimed to investigate the relationship between mindfulness, spiritual health, coronavirus stress, and anxiety in patients undergoing hemodialysis.

## 2 | METHODS

### 2.1 | Study design and settings

This was a cross-sectional and analytical study. The research settings were two hemodialysis centers (Shafa hospital and Javad Alaemeh Clinic) affiliated to Kerman University of Medical Sciences in the southeast Iran.

### 2.2 | Sample size and sampling

The study population consisted of all eligible patients under hemodialysis who were referred to the research settings. Inclusion criteria: (a) age above 18 years, (b) patients undergoing chronic hemodialysis, (c) the necessary skills to communicate effectively, and (d) reading and writing skills. Exclusion criterion is failure to complete more than 10% of each of the questionnaires.

From 208 patients under hemodialysis in Javad Alaemeh Clinic, 149 participants were eligible to participate in the study. Forty-four participants declined to participate, and 16 participants did not complete the questionnaire; therefore, 89 participants fulfilled the questionnaire. In the Javad Alaemeh Clinic, the response rate was 59.73%.

From 108 patients under hemodialysis in Shafa hospital, 82 participants were eligible to participate in the study. Nineteen participants declined to participate, and eight participants did not complete the questionnaire; therefore, 55 participants fulfilled the questionnaires. The response rate in the Shafa hospital was 67.07%. Finally, the total sample size of the study was 144.

## 2.3 | Instruments

### 2.3.1 | Demographic and clinical characteristics form

This form included age, sex, marital status, living place, educational level, occupation, insurance, individual/family monthly income, living with family, and history of addiction. Patients' clinical information also includes duration of dialysis, number of dialysis sessions per week, duration of each hemodialysis session, type of vascular access and underlying disease, medication and dialysis adequacy (based on patient record), infection of patients, family members, friends, and relatives with COVID-19, and the impact of COVID-19 on the course of treatment and access to health services.

### 2.3.2 | Coronavirus disease anxiety scale

The Coronavirus Disease Anxiety Scale (CDAS) was developed by Alipour et al in 2020 to measure coronavirus disease-related anxiety in Iranian population. This scale consists of 18 items and two subscales of psychological (nine items) and physical symptoms (nine items) in a 4-point Likert scale format (0 = never, 1 = sometimes, 2 = often, and 3 = always). The minimum score on this scale is 0 and the maximum score is 54, with a higher score reflecting a higher level of anxiety. In addition, the scores between 0 and 16 indicate no/mild anxiety, 17 and 29 reflect moderate anxiety, and 30 and 54 indicate severe anxiety. In the psychological symptom subscale, the scores between 0 and 5 indicate no/mild anxiety, 6 and 19 reflect moderate anxiety, and 20 and 27 indicate severe anxiety. In the physical symptom subscale, the scores between 0 and 1 indicate no/mild anxiety, 2 and 9 indicate moderate anxiety, and 10 and 27 indicate severe anxiety.<sup>27</sup> The CDAS has a goodness of fit index according to the confirmatory factor analysis.<sup>27</sup> In the present study, the Cronbach's alpha of CDAS was 0.93.

### 2.3.3 | Depression anxiety stress scale

The 21-item Depression, Anxiety and Stress Scale (DASS) was developed by Lovibond in 1995 to measure stress-anxiety-depression. DASS-21 was validated in different cultures such as Spain,<sup>28</sup> the United States,<sup>29</sup> Poland,<sup>30</sup> Chinese,<sup>31</sup> Vietnam,<sup>32</sup> and the Philippines<sup>33</sup> during the COVID-19 pandemic. The DASS-21 consists of three components, one of the subscales of which is stress with seven items. The scores range from zero (does not apply to me at all) to three (absolutely applies

to me). Since DASS-21 is the short form of the original version (42 items), the total score of each of the subscales must be doubled. Scores 0 to 14 show normal stress, scores 15 to 18 show mild stress, scores 19 to 25 show moderate stress, scores 26 to 33 show severe stress, and scores above 33 show very severe stress. Cronbach's alpha coefficient for the depression, anxiety, and stress scales was 0.81, 0.74 and 0.78, respectively in Iran.<sup>13</sup> In the present study, the Cronbach's alpha of stress subscale was 0.92.

### 2.3.4 | The Freiburg mindfulness inventory-short form

Later, Walach et al designed the short form (14 items) of this inventory, which is more suitable for the general population and groups that are not very familiar with the Buddhist root of mindfulness, and it can be used in different cultures. The items are based on a 4-point Likert scale (rarely = 1 to almost always = 4). It should be noted that the phrase number 13 is scored reversely. The minimum score in this questionnaire is 14 and the maximum is 56, with higher scores indicating a higher level of mindfulness. Ghasemi-Jobaneh et al showed acceptable and sufficient reliability of the short form of the Freiburg Mindfulness Inventory-short form (FMI-SF). The reliability coefficient of the whole scale was 0.83, indicating the good retest reliability of the inventory.<sup>34</sup> In the present study, the Cronbach's alpha of FMI-SF was 0.81.

### 2.3.5 | Spiritual health scale

The spiritual health scale of Palutzian and Ellison (1928) consists of 20 items with two subscales of religious health (10 items) and existential health (10 items). The items were about how much participants engage in spiritual health on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The score of spiritual health was the sum of the two subscales ranging from 20 to 120. The scores of 20 to 40, 41 to 99, and 100 to 120 show low, moderate, and high spiritual health, respectively. Its validity and reliability have been confirmed (Alpha coefficient = 0.82).<sup>35</sup> In the present study, the Cronbach's alpha of the spiritual health scale was 0.83.

## 2.4 | Data collection procedure and statistical analysis

The researchers referred to the centers after obtaining the code of ethics from the ethics committee. After selection of the eligible patients, clarification of the purpose of the study, and acquisition of the written consent from the patients, the ESRD patients completed the questionnaire when they were in a good physical condition. Questionnaires were collected during dialysis. The researchers interviewed uneducated patients to complete the questionnaires. The data were collected during 1 month (from August 15 to September 15, 2020).

**TABLE 1** Demographic characteristics of the participants and coronavirus disease 2019 (COVID-19) anxiety and stress differences among the participants

Variables	Frequency (%)	COVID-19 anxiety		Statistical test (P value)	COVID-19 Stress		Statistical test (P value)	
		Median	IQR		Median	IQR		
Age (yr.)	≤ 0	33 (22.9)	5.0	20	H = 2.12 P > .05	0.0	4	H = 7.52 P < .05
	50-70	84 (58.3)	10.0	18		2.0	15	
	>70	27 (18.8)	7.0	12		0.0	4	
Sex	Female	55 (38.2)	11.0	21	Z = -2.02 P < .05	2.0	18	Z = -2.59 P < .05
	Male	89 (61.8)	6.0	13		0.0	5	
Marital status	Single	10 (6.9)	5.50	16.50	H = 5.83 P = .05	0.0	2.5	H = 6.26 P < .05
	Married	112 (77.8)	7.0	14		0.0	10	
	Divorced/widowed	22 (15.3)	13.0	29.75		6.0	21	
Education level	Uneducated	24 (16.7)	10.0	16.5	H = 0.62 P > .05	4.0	14	H = 2.42 P > .05
	Middle/high school	61 (42.3)	9.0	15		0.0	10	
	Diploma	35 (24.3)	9.0	19		0.0	8	
	Academic	24 (16.7)	7.0	13.75		0.0	9	
Occupation	Employed	33 (22.9)	4.0	12.50	Z = -1.60 P > .05	0.0	5	Z = -1.56 P > .05
	Unemployed	111 (77.1)	10.0	16		0.0	12	
Individual/family monthly income (Million Tomans)	<1	52 (36.1)	7.0	17.75	H = 0.36 P > .05	0.0	13.5	H = 1.44 P > .05
	1-2	28 (19.4)	10.0	13.25		0.0	4	
	>2	64 (44.4)	8.5	14		0.0	11.50	
Living place	Kerman city	126 (87.4)	9.0	15	H = 4.03 P > .05	0.0	10	H = 2.02 P > .05
	Kerman villages	9 (6.3)	2.0	9		0.0	2	
	Other cities in Kerman province	9 (6.3)	15.0	33.50		10.0	19	
Insurance	Yes	141 (97.9)	9.0	14.5	Z = -1.18 P > .05	0.0	10	Z = -1.87 P > .05
	No	3 (2.1)	18.0	-		12.0	-	
Center	Javad Alaemeh	89 (61.8)	7.0	13.5	Z = -1.45 P > .05	0.0	6	Z = -2.30 P < .05
	Shafa	55 (38.2)	11.0	21		2.0	16	

Abbreviations: H, Kruskal–Wallis *H*; IQR, interquartile range; Z, Mann–Whitney *U*.

Data were analyzed using the IBM Statistical Package for Social Science (SPSS) version 25.0 (SPSS, Inc., Chicago, Illinois). Frequency, percentage, median, interquartile range, mean, and standard error were used to describe the sample characteristics, the CDAS, stress, mindfulness, and spiritual health scores. Spearman's rho correlation coefficient was used to check the correlations between CDAS, stress, mindfulness, and spiritual health scores. Since the parametric conditions were not established, Mann–Whitney *U* and Kruskal–Wallis *H* tests were used to check the association between qualitative variables, CDAS, and stress scores. The significance level was considered to be <.05.

## 2.5 | Ethical considerations

The code of ethics (IR.KMU.REC.1399.342) was received from the Ethics Committee of Kerman University of Medical Sciences. The researchers referred to the centers after obtaining approval from the concerned hospital. In this project, the purpose of the research was fully explained to the participants, who could withdraw from the study

at any time. They were explained that participating in or withdrawing from the study would not affect their course of treatment, and all their information would remain confidential.

## 3 | RESULTS

The mean age of the participants was  $59.11 \pm 13.60$  years (Min = 25 and Max = 87). The majority of the samples were male, married, educated, and unemployed. The majority of the participants were insured (Table 1). The clinical characteristics of the participants are presented in Table 2. Only seven patients were infected with COVID-19, and only 4.2% ( $n = 6$ ) of the family members of patients were infected with COVID-19. 22.9% ( $n = 33$ ) of the friends or relatives of patients were infected with COVID-19. Sixteen percent ( $n = 23$ ) of the patients believed that the COVID-19 outbreak and lockdown influenced their course of treatment.

The mean score of CDAS was  $12.03 \pm 11.89$ . Fifteen participants (10.4%) had severe anxiety, 26 (18.1%) had moderate anxiety, and

**TABLE 2** Clinical characteristics of the participants and coronavirus disease 2019 (COVID-19) anxiety and stress differences among the participants

Variables	Frequency (%)	COVID-19 Anxiety		Statistical test (P value)	COVID-19 Stress		Statistical test (P value)	
		Median	IQR		Median	IQR		
History of treated with hemodialysis (yr.)	≤ 1	36 (25.0)	10.5	13.75	H = 9.21 P > .05	0.0	10	H = 4.80 P > .05
	2	29 (20.1)	4.0	10		0.00	4	
	3	23 (16.0)	11.0	22		2.0	22	
	4	16 (11.1)	10.5	17.25		3.0	11.50	
	≥ 5	40 (27.8)	10.0	26.25		0.0	18	
Hemodialysis sessions per week	3	129 (89.6)	4.0	21	Z = -0.45 P > .05	2.0	12	Z = -0.58 P > .05
	Other	15 (10.4)	9.0	15		0.00	10	
Vascular access	Fistula/Graft	89 (61.8)	7.0	13.50	Z = -0.69 P > .05	0.0	9	Z = -0.66 P > .05
	Catheter	55 (38.2)	10.0	20		0.0	12	
History of addiction	Yes <sup>a</sup>	21 (14.6)	10.0	18	Z = -0.08 P > .05	0.0	15	Z = -0.73 P > .05
	No	123 (85.4)	8.0	14		0.0	42	
History of chronic disease	No	10 (6.9)	14.0	21.50	H = 2.72 P > .05	0.0	17	H = 1.45 P > .05
	Diabetes	75 (52.1)	7.0	15		0.0	10	
	Hypertension	43 (29.9)	8.0	14		0.0	6	
	Others	16 (11.1)	11.50	19.25		4.0	17	
Infected with the coronavirus	Yes	7 (4.9)	9.0	9	Z = -0.37 P > .05	0.0	4	-0.92 P > .05
	No	137 (95.1)	9.0	15.50		0.0	11	
Family member infected with the coronavirus	Yes	6 (4.2)	9.0	23.50	Z = -0.31 P > .05	0.0	19.50	Z = -0.21 P > .05
	No	138 (95.8)	9.0	15		0.0	10	
Friends infected with the coronavirus	Yes	33 (22.9)	7.0	17	Z = -0.16 P > .05	0.0	10	Z = -0.2 P > .05
	No	111 (77.1)	9.0	14		0.00	10	
Effect of COVID on treatment	Yes <sup>b</sup>	23 (16.0)	7.0	21	Z = -0.32 P > .05	0.0	4	Z = -0.34 P > .05
	No	121 (84.0)	9.0	14.50		0.0	11	

Abbreviations: H, Kruskal–Wallis *H*; IQR, interquartile range; Z, Mann–Whitney *U*.

<sup>a</sup>Type of addiction: Cigarette, opium, and methadone.

<sup>b</sup>Problem in accessing to drugs, problems in accessing to physicians, delaying in transplantation surgery.

103 (71.5%) had no/mild anxiety. Based on the CDAS score, about 30% had moderate to severe anxiety.

The mean score of the CDAS-psychological symptom subscale was  $9.10 \pm 7.93$  (Min = 0, Max = 27). Twenty-two (15.3%) had severe psychological symptoms of anxiety, 56 (38.9%) had moderate, and 66 (45.8%) had no/mild psychological symptoms of anxiety. Based on the CDAS-psychological symptom subscale score, about 54.2% had moderate to severe psychological symptoms of anxiety. The mean score of the CDAS-physical symptom subscale was  $2.94 \pm 4.80$  (Min = 0, Max = 27). Seventeen participants (11.8%) had severe physical symptoms of anxiety, 43 (29.9%) had moderate, and 84 (58.3%) had no/mild physical symptoms of anxiety. Based on the CDAS-physical symptom subscale score, about 41.7% had moderate to severe physical symptoms of anxiety.

Among the CDAS-psychological symptom subscale items, 70.9% of the participants ( $n = 102$ ) often/always were concerned about the transmission of coronavirus to others. Among the CDAS-physical symptom subscale items, 16% of the participants ( $n = 23$ )

often/always reduced their physical activity because of fear of coronavirus (Table 3).

The mean score of stress was  $6.58 \pm 10.71$ . Seven participants (4.9%) had very severe stress, 5 (3.5%) had severe stress, 7 (4.9%) had moderate stress, 6 (4.2%) mild stress, and 119 (82.6%) had no stress.

The mean score of mindfulness was  $40.83 \pm 7.11$ , which was greater than the midpoint of the questionnaire, that is, 35. The mean score of spiritual health was  $91.52 \pm 12.69$  (Table 4). Forty-two (29.2%) participants ( $n = 42$ ) had a high level of spiritual health, 101 (70.1%) had a moderate level of spiritual health, and only one patient had poor spiritual health.

No significant correlation was found between CDAS and spiritual health, but there was a negative weak correlation between CDAS and mindfulness. No significant correlation was found between stress, spiritual health, and mindfulness. There was a significant moderate correlation between mindfulness and spiritual health (Table 4).

Female patients had greater anxiety than males ( $P < .05$ ). The CDAS score did not differ in other qualitative variables (Tables 1 and 2).

**TABLE 3** The participants' responses to coronavirus disease anxiety scale

Items	Responses (N/%)			
	Never	Sometimes	Often	Always
1. Thinking about coronavirus makes me anxious.	81 (56.2)	18 (12.5)	23 (16.0)	22 (15.3)
2. I feel tense when I am thinking about the coronavirus threat.	94 (65.3)	19 (13.2)	18 (12.5)	13 (9.0)
3. I am extremely worried about the spread of coronavirus disease.	76 (52.7)	20 (13.9)	21 (14.6)	27 (18.8)
4. I am afraid of being infected with coronavirus.	68 (47.2)	21 (14.6)	12 (8.3)	43 (29.9)
5. I think I may get coronavirus at any moment.	80 (55.6)	23 (16.0)	11 (7.6)	30 (20.8)
6. I think I have gotten the coronavirus with every single sign and check myself.	98 (68.0)	16 (11.1)	8 (5.6)	22 (15.3)
7. I am worried about the transmission of the coronavirus to people around me.	24 (16.7)	18 (12.4)	22 (15.3)	80 (55.6)
8. Coronavirus anxiety has disrupted my activities.	91 (63.2)	24 (16.7)	12 (8.3)	17 (11.8)
9. The media attention to coronavirus worries me.	74 (51.4)	26 (18.1)	23 (16.0)	21 (14.6)
10. Thinking about coronavirus has disturbed my sleep.	112 (77.7)	22 (15.3)	6 (4.2)	4 (2.8)
11. Thinking about coronavirus has made me lose my appetite.	119 (82.6)	17 (11.8)	5 (3.5)	3 (2.1)
12. I get headache when I am thinking about coronavirus.	121 (84.0)	14 (9.7)	8 (5.6)	1 (0.7)
13. My body trembles when I am thinking about corona.	118 (81.9)	15 (10.4)	7 (4.9)	4 (2.8)
14. When I am thinking about corona, I get goose bumps.	128 (88.8)	8 (5.6)	6 (4.2)	2 (1.4)
15. Coronavirus has become a nightmare for me. <sup>a</sup>	107 (74.3)	17 (11.8)	10 (6.9)	10 (6.9)
16. My physical activity has decreased due to the fear of coronavirus.	100 (69.4)	21 (14.6)	16 (11.1)	7 (4.9)
17. It is difficult for me to talk about coronavirus with others.	102 (70.8)	20 (13.9)	14 (9.7)	8 (5.6)
18. I get a heartbeat when I am thinking about coronavirus.	125 (86.8)	13 (9.0)	3 (2.1)	3 (2.1)

<sup>a</sup>Missing data.

**TABLE 4** The correlation between coronavirus disease 2019 (COVID-19) related anxiety, stress, mindfulness, and spiritual health among patients under hemodialysis

Variable	Mean	SE	Median	IQR	Spearman's rho correlation coefficient (P value)			
					COVID-19 Anxiety	COVID-19 Stress	Mindfulness	Spiritual health
COVID-19 anxiety	12.03	1.0	9	15	1			
COVID-19 Stress	6.58	0.89	0	10	$r = 0.73^{***}$ $P < .001$	1		
Mindfulness	40.83	0.59	41.50	9	$r = -0.20^*$ $P < .05$	$r = -0.13$ $P > .05$	1	
Spiritual health	91.52	1.06	93	13.50	$r = -0.11$ $P > .05$	$r = -0.15$ $P > .05$	$r = 0.51^{***}$ $P < .001$	1

Abbreviations: IQR, interquartile range; r, correlation coefficient.

\*\*\* $P < .001$ ; \* $P < .05$ .

Stress scores were significantly higher among patients aged 50 to 70 years old than others ( $P < .05$ ). Female patients had greater stress than males ( $P < .05$ ). The divorced/widowed had higher stress than married and single ones ( $P < .05$ ). Patients referred to Shafa hospital had higher stress than those who were referred to Javad Alaemeh clinic ( $P < .05$ ) (Tables 1 and 2).

## 4 | DISCUSSION

For therapeutic goals and effectiveness, it will be helpful to know how hemodialysis patients cope with anxiety and stress in stressful situations,<sup>36</sup> such as the coronavirus outbreak. The current study aimed to investigate the correlation between mindfulness, spiritual

health, coronavirus stress, and anxiety in hemodialysis patients. A review of the literature shows that it is the first study that examines the correlation between mindfulness, spiritual health, coronavirus stress, and anxiety in hemodialysis patients.

The present study showed a weak negative correlation between coronavirus anxiety and mindfulness. Yang et al also showed that mindfulness-based stress therapy reduced depression and anxiety in hemodialysis patients.<sup>37</sup> Haghshenas et al in Iran showed that mindfulness-based stress reduction (MBSR) might reduce anxiety and depression in hemodialysis patients.<sup>38</sup> MBSR cannot prevent negative emotions but can improve the patient's negative emotions and maintain inner peace by strengthening mindfulness thoughts and meditation. Patients in these conditions can pay better attention to feelings and emotions by enhancing sensory perception and learn to properly deal with emotional changes in stressful situations. The results show that MBSR intervention significantly increases the activation of the prefrontal cortex of the left brain, which is involved in emotional regulation of the patients.<sup>39</sup>

Several studies have shown that cognitive behavioral therapy (CBT) helps hemodialysis patients. The results of Ng et al showed that CBT could have an effective role in reducing symptoms of depression and anxiety as well as improving quality of life in hemodialysis patients with comorbid depression.<sup>40</sup> Also, they emphasize the positive role of Internet CBT, as it can reduce COVID-19 transmission. Internet CBT can treat psychiatric symptoms during COVID-19.<sup>41</sup> Internet CBT is a cost-effective method<sup>42</sup> that can treat psychiatric symptoms such as insomnia.<sup>43</sup> Furthermore, Dehghan et al showed that perceived stress was not related to mindfulness.<sup>44</sup> In some chronic patients, such as cancer patients, no significant association was found between corona disease anxiety and mindfulness.<sup>45</sup> According to the results of the present study, mindfulness can be used as an adjunctive intervention to manage emotions and reduce anxiety in crises such as coronavirus disease, but it has no effect on stress. Therefore, the present study shows a weak negative correlation between coronavirus anxiety and mindfulness and no correlation between mindfulness and stress. However, researchers consider the probability of influencing some other factors that have become significant in the present study, and these potential influencing factors should be considered. Therefore, the impact of these possible factors should be studied in further studies and in different communities.

Another result of the present study was the lack of association between coronavirus anxiety, stress, and spiritual health. Alshraifeen et al showed no significant correlation between spirituality, depression, and anxiety in hemodialysis patients.<sup>46</sup> In some chronic patients, such as cancer patients, no significant association was found between corona disease anxiety and spiritual health.<sup>45</sup> Hemodialysis patients use religious and spiritual beliefs and practices as a mechanism to overcome their depression, anxiety, and stress.<sup>47</sup> These results may be due to the prevalence of stress and anxiety among respondents. In the present study, 10.4% had severe anxiety, 18.1% had moderate anxiety, and 71.5% had mild anxiety. Alshraifeen et al showed that 8.9% of the hemodialysis patients had severe anxiety, 13.4% had moderate anxiety, and 77.7% had low anxiety levels in non-COVID-19 conditions.<sup>46</sup> This study is almost consistent with the results of the

present study, which shows the low effect of coronavirus disease on the anxiety level of hemodialysis patients due to the stressful conditions. Gurkan et al showed that according to the Hospital Anxiety and Depression Scale (HADS), 28.2% of the dialysis patients were at risk of anxiety.<sup>36</sup> These results may indicate an increase in the spiritual health of hemodialysis patients in the coronavirus outbreak.

Muslim patients consider illness, pain, and suffering as a divine experiment that alleviates one's sins.<sup>48</sup> These results have been confirmed by other studies on Muslim hemodialysis patients.<sup>46</sup> Gurkan et al found that turning to religion was the most common strategy of hemodialysis patients to cope with anxiety and depression.<sup>36</sup> According to Gurkan, Turkish hemodialysis patients are more likely to use religious coping than Western ones.<sup>36</sup> Musa et al showed that the spiritual health of most hemodialysis patients was associated with low levels of depression, anxiety, and stress.<sup>47</sup> These results highlight the role of religious beliefs and practices in overcoming depression, anxiety, and stress during illness. However, hemodialysis patients are under a lot of stress, and coronavirus disease may not have a significant effect on increasing their anxiety and stress levels. Therefore, further studies are needed to evaluate the stress and depression of hemodialysis patients and investigate other factors that may affect such correlations.

In the present study, women were more anxious and stressed. The divorced/widowed were also under a lot of stress. In line with the results of the present study, Martinez et al showed that the highest rate of psychological stress was observed in hemodialysis women.<sup>49</sup> In addition, Alshraifeen et al in Jordan showed that lower levels of education and more illnesses were associated with more anxiety in hemodialysis patients.<sup>46</sup> Gholami et al showed that variables of living place, comorbidity, and age were the predictors of death anxiety in hemodialysis patients.<sup>50</sup> The results show that several factors are involved in the anxiety and stress of hemodialysis patients. Depression and anxiety are the most common psychological complications of hemodialysis patients due to the many problems associated with the disease, such as loss of freedom, life expectancy, energy, job, income, and sexual ability.<sup>51</sup> Therefore, the attention of health care providers plays a supportive role in improving the health status of patients and helping improve coping mechanisms in patients with kidney problems. Further detailed studies are required on anxiety and stress in hemodialysis patients and the various factors affecting them.

To better understand the problems in hemodialysis patients, it is necessary to consider other issues related to COVID-19 disease, to control the anxiety of these patients in future research, such as evaluating the feelings of hemodialysis patients about the COVID-19 vaccine, since the factors related to the willingness to pay for the COVID-19 vaccine were different between psychiatric patients and healthy individuals.<sup>52</sup>

#### 4.1 | Study limitations

The limitations of our study could be explored in the future. This cross-sectional study does not examine the cause-and-effect relationship, so longitudinal research is suggested in this regard. Since the

study sample is patients under hemodialysis in two public centers and the specific status and the long course of treatment of hemodialysis patients can affect the variables, the results should be generalized with caution. It is also suggested that the present study be repeated in other cultures and societies and that future research focus on different dimensions of stress and anxiety and other possible effective factors such as seasonal changes. Although the sample size was appropriate for this target population ( $n = 144$ ), the results of the present study cannot be generalized to the entire population of hemodialysis patients in Iran. Future research is recommended in larger samples, including all regions of Iran, Iranian Muslim and non-Muslim hemodialysis patients, and hemodialysis patients with different Iranian ethnicities. The COVID-19 pandemic was found to cause hemodynamic changes in the brain.<sup>53,54</sup> This study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make clinical diagnosis. The gold standard for establishing a psychiatric diagnosis involves structured clinical interviews and functional neuroimaging.<sup>55,56</sup>

## 5 | CONCLUSION

The results of this study showed that coronavirus anxiety and stress were among the most common and significant negative emotions in Iranian hemodialysis patients. Mindfulness may be effective in reducing coronavirus anxiety in hemodialysis patients, and spirituality has no effect on anxiety and depression. According to the obtained results, it is suggested to pay special attention to the constructs of mindfulness to increase the level of mindfulness, cope effectively with stresses and stressors, and empower hemodialysis patients. It is also suggested that other factors related to anxiety and depression in hemodialysis patients be evaluated in future research.

### 5.1 | Implications for practice

The results of this study showed that increasing mindfulness could be important in reducing stress and anxiety of hemodialysis patients during the coronavirus outbreak. Given the direct role of mindfulness, this study recommends the use of mindfulness training in reducing some of the consequences of coronavirus disease, such as stress and anxiety for clinical practice. Nurses can directly use mindfulness for hemodialysis patients in supportive therapies in addition to the main treatments with the aim of strengthening and correcting the acute condition of patients and especially reducing the psychological symptoms of coronavirus disease. A future support program aimed at improving some psychological aspects and reducing mindfulness-based stress can strengthen hemodialysis patients in dealing with problems. Nurses and physicians should pay attention to the mindfulness program and help patients perform mindfulness interventions and control the complications and problems caused by crises such as coronavirus disease.

## ACKNOWLEDGMENTS

We would thank all patients for their cooperation. The approved research project code was 99000338.

## FUNDING

No funding or research grant was received in the course of study.

## CONFLICT OF INTEREST

The authors declare that they have no competing interests in this section.

## AUTHOR CONTRIBUTIONS

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Mohammad Ali Zakeri had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

## TRANSPARENCY STATEMENT

The Mohammad Ali Zakeri affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

## DATA AVAILABILITY STATEMENT

The data used to support the findings of this study are available from the corresponding author upon request.

## ETHICS STATEMENT

The code of ethics (IR.KMU.REC.1399.342) was received from the Ethics Committee of Kerman University of Medical Sciences.

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**How to cite this article:** Dehghan M, Namjoo Z, Mohammadi Akbarabadi F, Fooladi Z, Zakeri MA. The relationship between anxiety, stress, spiritual health, and mindfulness among patients undergoing hemodialysis: A survey during the COVID-19 outbreak in Southeast Iran. *Health Sci Rep.* 2021;4: e461. doi:10.1002/hsr.2.461