



The Relationship between Coronavirus Anxiety, Mindfulness and Spiritual Health in Patients with Cancer: A Survey in Southeast Iran

Mahlagha Dehghan¹, Zakieh Namjoo², Ahmad Zarei², Hanieh Tajedini², Amir Bahrami², and Mohammad Ali Zakeri^{3,4} ✉

¹Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran

²Student Research Committee, School of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran

³Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

⁴Social Determinants of Health Research Centre, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

Objective The sudden outbreak of COVID-19 has caused major health problems, including anxiety in cancer patients worldwide. Spiritual health and mindfulness are considered as factors affecting anxiety. This study addressed the relationship between COVID-19 anxiety, spiritual health and mindfulness in patients with cancer.

Methods One hundred and eighty-four cancer patients participated in this cross-sectional study. The data were collected with convenience sampling method from two oncology centers from 15 June to 15 July 2020 in the southeast Iran. Patients completed the Demographic and Clinical Characteristics Form, Corona Disease Anxiety Scale (CDAS), The Freiburg Mindfulness inventory-Short Form (FMI-SF) and Spiritual Health Scale.

Results According to the psychological symptom subscale (CDAS), 61.4% of the participants had moderate to severe anxiety. According to the physical symptom subscale, 38% of the participants had moderate to severe anxiety. No significant association was found between corona disease anxiety and mindfulness/spiritual health ($p > 0.05$).

Conclusion The results of this study showed high levels of mental and physical anxiety and worries about COVID-19 disease in cancer patients, which led to challenges in their lives. It is necessary to review and implement effective interventions in future studies to prevent anxiety and its consequences in cancer patients.

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Key Words COVID-19, Cancer, Anxiety, Mindfulness, Spiritual health.

INTRODUCTION

The sudden outbreak of pneumonia in China in late 2019 led to the identification of a new virus called 2019-nCoV (COVID-19), which quickly became a health problem in the world. The high contagiousness of the virus prompted the World Health Organization (WHO) to declare a pandemic condition in the world.¹ The latest meta-analysis of 50,466 infected patients showed the mortality rate of 4.3%. However, most of those who

died had previous chronic and underlying diseases with weakened immune systems.² Studies have shown that cancer is a risk factor for severe complications and the course of the disease in patients with COVID-19.³ Cancer has become a major health problem worldwide, ranking the second in the US.⁴ According to studies, more than 16.9 million Americans had cancer until January 1, 2019, and it is predicted that more than 22.1 million people will have suffered from cancer by January 1, 2030 because of the growth of aging in communities.⁵

Cancer patients are exposed to many traumas and problems caused by other diseases due to the problems associated with this disease and systemic immunosuppressive state because of malignancy and treatments such as chemotherapy or surgery. The risk of acute conditions in cancer patients is significantly higher than that in the general population. Therefore, cancer patients may be at higher risk for COVID-19 with a poorer prognosis.^{6,7} The prevalence of COVID-19 infection in

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✉ **Correspondence:** Mohammad Ali Zakeri, MSc

Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Health Center No. 4, Western Amir Kabir Avenue, Rafsanjan, Kerman province, Iran

Tel: +98 34 34323481, **E-mail:** ma.zakeri115@gmail.com

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cancer patients has been reported to be up to 7.8%, which despite cancer, increases the susceptibility to COVID-19 infection in individuals.⁸

In the COVID-19 epidemic, cancer patients are at greater risk for health-related quality of life (HRQoL) problems, anxiety, and mental and physical stress.⁹ COVID-19 anxiety can influence cancer patients' decision on seeking and continuing treatment. Cancer patients face many challenges and anxious situations in the prevalence of COVID-19 disease, which lead to non-referral to hospitals and follow-up treatment,¹⁰ and the possibility of canceling appointments at the oncology/hematology clinic.¹¹ Anxiety about COVID-19 is common and seems to be due to the unknown and confusing nature of the virus. Fear of the unknown reduces the perception of immunity in humans and has always been stressful for them. Studies have reported high levels of anxiety and stress in the prevalence of COVID-19 disease.^{12,13} Anxiety is defined as a feeling of worry, anger, or dissatisfaction with something with an uncertain outcome.¹⁴ High, persistent, and long-term anxiety and stress can lead to maladaptation, and if the stresses experienced are not properly managed, they will have a great impact on individuals' health.¹⁵

Mindfulness-based therapy is a method through which the patient becomes aware of negative emotions such as anxiety and stress.¹⁶ Mindfulness is a balanced mental framework and a concept related to awareness and consciousness, which prevents emotional and unfortunate magnifications and provides an opportunity to distance oneself from unpleasant emotional states such as various pressures and stresses.¹⁷ Various studies have shown that mindfulness can reduce stress and anxiety of the cancer patients.¹⁸⁻²² Mindfulness can affect the quality of life of cancer patients directly and indirectly.²³ Mindfulness plays a vital role in explaining the important components of mental health in cancer patients. Mehdi Pour and Kord²⁴ have shown that mindful people evaluate life-threatening situations with less anxiety and stress and adapt to stressful situations more. Tate et al.²⁵ showed that mindfulness created a new and alternative perspective on how patients can change their perceptions of themselves and the world around them. Hsieh et al.²⁶ showed that mindfulness was significantly associated with stress and depressive symptoms in the caregivers of the lung cancer patients. Zhong et al.²⁷ also indicated that mindfulness was negatively associated with perceived stress, anxiety and depression, and loss of self-confidence in Chinese patients with gastrointestinal cancer.

Spirituality is a factor that may be effective in coping with stress and anxiety related to the COVID-19. Spirituality is one of the human capabilities that provides problem-solving and coping strategies. In addition, spirituality, as a source of social support creates a meaningful sense for coping with confusion

and natural disasters, and increases the sense of indirect control over events.²⁸ Many physicians today consider faith and spirituality an important source in physical health, so that it is necessary to pay attention to patients' spiritual issues in the course of treatment.²⁹ Spiritual health can be defined as a sense of communication with others, perception of meaning and goals, and association with a superior power that helps people live better and interact more effectively with the world around them. Spiritual health is created when people voluntarily strengthen their spiritual power through prayer, relaxation, and association with like-minded people, learning from a spiritual guide and reading.³⁰

A review of the literature shows that most studies have focused on variables related to COVID-19 anxiety in the general population or medical team^{31,32} and few studies in particular have focused on the factors associated with the COVID-19 anxiety in cancer patients.³³ Regarding the importance of spiritual health and mindfulness in promoting adaptation to chronic diseases and the limited number of studies in this regard, this study aimed to investigate the relationship between COVID-19 anxiety, mindfulness and spiritual health in cancer patients in southeastern Iran.

METHODS

Study design and setting

This was a cross-sectional and descriptive-analytical study. The research settings were two oncology centers (Bahonar Hospital and Javad Alaemeh Clinic) affiliated to Kerman University of Medical Sciences. Javad-Alaemeh Clinic with 25 beds and Bahonar Hospital with 45 beds admitted patients in three shifts (morning, evening & night). These centers are the crowded ones in the southeast Iran.

Sample size and sampling

The study population consisted of male and female patients with cancer referred to the research setting. Patients with the inclusion criteria were considered eligible to participate in the study.

Inclusion criteria: 1) patients aged over 18 years (to have a correct understanding of the questions), 2) patients diagnosed with cancer. Exclusion criteria: 1) patient's psychological and physiological instability during sampling, 2) failure to complete more than 10% of each of the questionnaires.

A pilot study on 30 eligible participants and the following formula were used to estimate the sample size.

$$n = \left(\frac{z_{1-\frac{\alpha}{2}} + z_{1-\beta}}{0.5 \ln \left(\frac{1+r}{1-r} \right)} \right)^2 + 3$$

The type I and type II errors were considered 0.05% and 20%, respectively. The correlation coefficient between COVID anxiety and mindfulness of the patients with cancer in the pilot study was 0.227. According to the aforementioned indicators, 151 samples were included in this study. Concerning the probability of dropouts, 225 questionnaires were provided to the samples with inclusion criteria, of which 184 questionnaires were completed. Therefore, the response rate was 81.77%. Furthermore, out of 184 completed questionnaires, there was less than 0.01 missing value. Therefore, 184 questionnaires were statistically analyzed. It is noteworthy that the pilot study was considered in the total sample. Convenience sampling method was used.

Measures

Demographic and Clinical Characteristics Form

This form included age, sex, marital status, educational level, occupation, monthly income, living place, living with family, duration of diagnosis with cancer, type of cancer, type of treatment, being aware of cancer, history of addiction, other chronic diseases, infection with COVID-19 (his/herself, family member, friend or relative), and the effect of COVID-19 related conditions on the course of cancer treatment.

Corona Disease Anxiety Scale (CDAS)

The CDAS was developed by Alipour et al.³⁴ in 2020 to measure corona disease related anxiety in Iranina population. This scale consists of 18 items and two subscales of psychological (9 items) and physical symptoms (9 items) in a 4-point Likert scale format (0=never, 1=sometimes, 2=often, and 3=always). The minimum score of this scale is 0 and the maximum score is 54, with higher score indicating higher level of anxiety. In addition, the scores between 0–16 indicate no/mild anxiety, 17–29 reflect moderate anxiety and 30–54 indicate severe anxiety. In the psychological symptom subscale, the scores between 0–5 indicate no/mild anxiety, 6–19 reflect moderate anxiety and 20–27 indicate severe anxiety. In the physical symptom subscale, the scores between 0–1 indicate no/mild anxiety, 2–9 reflect moderate anxiety and 10–27 indicate severe anxiety.

The CDAS shows a good internal consistency. Its Cronbach's alpha was reported to be 0.91 for samples aged 18–60 years old. The CDAS has a convergent validity with General Health Questionnaire-28 [GHQ-28 ($r=0.48$, $p=0.01$)]. In addition, The CDAS has goodness of fit index according to confirmatory factor analysis.³⁴ In the present study, the Cronbach's alpha of CDAS was 0.87.

The Freiburg Mindfulness inventory-Short Form (FMI-SF)

Buchheld et al.^{35,36} designed the initial Freiburg Mindfulness

Inventory, which consisted of 30 items. The initial form of this inventory includes 4 factors such as mindful presence, non-judgmental acceptance, openness to experience and insight.³⁵ Later, Walach et al.³⁵ designed the short form (14 items) of this inventory, which is more suitable for the general population and for groups that are not very familiar with the Buddhist root of mindfulness and it can be used in different cultures. Kohls et al.³⁷ showed that the short form measured the two factors of presence and acceptance. 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 score reflecting higher mindfulness.³⁵

Ghasemi Jobaneh et al.³⁸ showed acceptable and sufficient reliability of the short form of the Freiburg Mindfulness Inventory (FMI-SF). The reliability coefficient of the whole scale was 0.83 indicating the good retest reliability of the inventory. In the present study, the Cronbach's alpha of FMI-SF was 0.84.

Spiritual health scale

The spiritual health scale of Palutzian & Ellison (1928) was used to measure the spiritual health, which consists of 20 items with two subscales of religious health (ten items) and existential health (ten items). The items were about how much participants engage in spiritual health with a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The score for the spiritual health was the sum of the two subscales ranging from 20 to 120. The scores of 20–40, 41–99, and 100–120 show low, moderate, and high spiritual health, respectively. Its validity and reliability have been confirmed (Alpha coefficient=0.82).³⁹ In the present study, the Cronbach's alpha of the spiritual health scale was 0.81.

Data collection procedure and statistical analysis

The researchers referred to the centers after obtaining a code of ethics from the ethics committee. After selecting the eligible patients, clarifying the purpose of the study, and obtaining written consent from the patients, the patients completed the questionnaire when they were in a good physical condition. For those patients who were unaware of their diseases or uneducated, a researcher asked the questions orally and filled the questionnaire. The interviewers were nursing students and had no conflict of interest (i.e. they did not know any patients and they were not passing any courses in oncology centers when interviewing the participants). The data were collected during one month (from 15 June to 15 July 2020).

SPSS 25 (IBM Corp., Armonk, NY, USA) was used for data analysis. Frequency, percentage, mean and standard deviation were used to describe the sample characteristics, the CDAS, mindfulness and spiritual health scores. Spearman's rho corre-

lation coefficient was used to check the correlations between CDAS, mindfulness and spiritual health scores. Mann-Whitney U and Kruskal-Wallis H tests were used to check the association between qualitative variables and CDAS score. Significance level was considered 0.05.

Ethical considerations

The code of ethics (IR.KMU.REC.1399.182) was received from the Ethics Committee of Kerman University of Medical Sciences. 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.

RESULTS

The mean age of the study participants was 52.85±14.66 years (min=20 and max=80). The majority of the samples were female, married, educated, and unemployed. The monthly income level of most of the samples was <2 million Tomans a month (25,000 Tomans=one Dollar). The majority of the participants were insured and living with their family (Table 1). The clinical characteristics of the participants are presented in Table 2. Only one patient was infected with COVID-19 and only 1.6% (n=3) of the family members of patients with cancer were infected with COVID-19. 7.6% (n=14) of the friends or relatives of patients were infected with COVID-19. 26.1% (n=48) of the patients believed that COVID-19 outbreak and lock-down influenced their course of cancer treatment.

Table 1. Demographic characteristics of the participants and COVID-19 anxiety differences among the participants

Variable	Frequency (%)	COVID-19 anxiety			Statistical test	p value
		Mean	SD	Median		
Sex					Z=-0.26	0.80
Female	106 (57.6)	12.29	11.51	9		
Male	78 (42.4)	11.95	11.55	8		
Marital status					H=3.73	0.16
Single	15 (8.2)	8.53	9.62	4		
Married	152 (82.6)	12.75	11.74	9		
Divorced/widow(er)	17 (9.2)	9.94	10.43	8		
Education level					H=4.22	0.24
Uneducated	41 (22.3)	11.61	14.02	5		
Middle/high school	57 (31.0)	11.79	10.56	9		
Diploma	45 (24.5)	13.62	11.63	10		
Academic	41 (22.3)	11.56	9.99	9		
Occupation					Z=-2.21	0.027
Employed	60 (32.6)	14.85	12.66	11		
Unemployed	124 (67.4)	10.84	10.70	8		
Income (Million Tomans)					H=7.55	0.023
<1	59 (32.1)	11.41	12.49	7		
1-2	54 (29.3)	15.39	11.91	12		
>2	71 (38.6)	10.30	9.88	8		
Living place					H=4.40	0.22
Kerman city	96 (52.2)	11.09	10.24	8		
Kerman villages	17 (9.2)	8.35	9.75	6		
Other cities in Kerman province	61 (33.2)	14.16	12.48	11		
Other provinces	10 (5.4)	16.40	16.88	13		
Living with family					Z=-0.34	0.74
Yes	177 (96.2)	12.06	11.45	8		
No	7 (3.8)	14.28	13.47	9		

SD: standard deviation, H: Kruskal-Wallis H, Z: Mann-Whitney U

The mean score of CDAS was 12.15 ± 11.50 (min=0, max=50). Eighteen participants (9.8%) had severe anxiety, 34 (18.5%) had moderate anxiety and 132 (71.7%) had no/mild anxiety. The mean score of CDAS-psychological symptom subscale was 9.44 ± 8.05 (min=0, max=27). Thirty-one (16.8%) had severe anxiety, 82 (44.6%) had moderate anxiety and 71 (38.6%) had no/mild anxiety. The mean score of CDAS-physical symptom subscale was 2.71 ± 4.56 (min=0, max=23). Nineteen participants (10.3%) had severe anxiety, 51 (27.7%) had moderate anxiety and 114 (62%) had no/mild anxiety.

Among the CDAS-psychological symptom subscale items, 59.3% of the participants often/always were concerned about

the transmission of coronavirus to others and 40.2% were extremely worried about the spread of corona disease. Among the CDAS-physical symptom subscale items, 19.5% of the participants often/always reduced their physical activities because of fear of coronavirus and the corona disease has become a nightmare in 13.1% of them (Table 3).

The mean score of mindfulness was 40.52 ± 7.84 , which was greater than the midpoint of the questionnaire i.e. 35. The mean score of spiritual health was 91.58 ± 14.01 (Table 4). Fifty-one (27.7%) of the participants had high level of spiritual health, 132 (71.7%) had moderate level of spiritual health and only one patient had poor spiritual health.

Table 2. Clinical characteristics of the participants and COVID-19 anxiety differences among the participants

Variable	Frequency (%)	COVID-19 anxiety			Statistical test	p value
		Mean	SD	Median		
Duration of diagnosis with cancer (months)					H=0.52	0.92
≤6	78 (42.4)	12.44	11.42	10		
7–12	52 (28.3)	11.19	11.26	7		
13–24	37 (20.1)	11.40	9.48	9		
>24	17 (9.2)	15.35	16.19	10		
Type of cancer					H=9.37	0.15
Breast	52 (28.3)	10.17	11.16	6.5		
Gastrointestinal	47 (25.5)	14.26	11.33	12		
Respiratory	27 (14.7)	9.07	9.31	6		
Lymphoma	14 (7.6)	15.07	14.26	12.5		
Bone marrow	9 (4.9)	9.33	10.95	6		
Genitalia	18 (9.8)	14.94	14.03	11		
Other	17 (9.2)	13.35	10.31	11		
Cancer treatment					H=3.95	0.27
Chemotherapy	75 (40.8)	12.91	11.14	11		
Chemotherapy/surgery	64 (34.8)	10.48	10.67	7		
Chemotherapy/radiotherapy/surgery	32 (17.4)	14.56	13.78	9		
Other	13 (7.0)	10.0	11.07	5.0		
Being aware of cancer					Z=-0.56	0.57
Yes	147 (79.9)	12.23	11.41	8		
No	37 (20.1)	11.81	12.0	9		
History of addiction					Z=-0.61	0.54
Yes	44 (23.9)	12.57	13.55	6.5		
No	140 (76.1)	12.01	10.82	9		
History of chronic disease					Z=-0.24	0.81
Yes	146 (79.3)	12.21	11.43	9		
No	38 (20.7)	11.89	11.88	8		
Effect of COVID on treatment					Z=-1.66	0.10
Yes	48 (26.1)	14.6	12.21	11		
No	136 (73.9)	11.28	11.15	8		

SD: standard deviation, H: Kruskal-Wallis H, Z: Mann-Whitney U

No significant correlation was found between CDAS, mindfulness and spiritual health. There was a significant correlation between mindfulness and spiritual health (Table 4).

No significant correlation was found between CDAS and age ($r=-0.12, p=0.12$). CDAS score of the employed patients was significantly greater than that of unemployed patients ($p=0.027$). CDAS score of the patients with less than 2-million-Toman income was significantly greater than that of those with higher income ($p=0.023$). CDAS score was not different among other qualitative variables (Tables 1 and 2).

DISCUSSION

In the unfavorable conditions of the COVID-19, it is crucial to study the negative factors related to this disease and reduces the long-term psychological burden.⁴⁰ This study aimed to determine the relationship between the COVID-19 anxiety, mindfulness and spiritual health in cancer patients. In the present study, more than a quarter of the participants had moder-

ate/severe anxiety and 26.1% of them believed that the prevalence of COVID-19, its barriers and conditions affected the course of treatment. Chen et al.³³ also showed a high prevalence of fear of disease progression, anxiety and depression in cancer patients during the outbreak of COVID-19. Use of Self-Rating Anxiety Scale (SAS) in respiratory cancer patients showed a positive association between anxiety level, delayed treatment, discontinuation of treatment, deep concern about COVID-19, and diagnosis of respiratory cancer. Liang et al.³ showed that COVID-19 anxiety could influence cancer patients' decision on seeking and continuing treatment. Lives of cancer patients have been affected by the onset of COVID-19 and a variety of challenges. Due to the critical condition of COVID-19 disease, cancer patients have to spend more time at home and less time in the community. Cancer patients' communication with the community and their health care professionals, who convey accurate information about the disease has decreased.⁴¹ The current state of the COVID-19 epidemic has also made it difficult for doctors to make decisions. The daily routine of can-

Table 3. The participants' responses to Corona Disease Anxiety Scale

Items	Responses (N/%)			
	Never	Sometimes	Often	Always
1. Thinking about coronavirus makes me anxious.	88 (47.8)	42 (22.8)	13 (7.1)	41 (22.3)
2. I feel tense when I am thinking about the corona threat.	99 (53.8)	37 (20.1)	11 (6.0)	37 (20.1)
3. I am extremely worried about the spread of corona disease.	68 (37.0)	42 (22.8)	19 (10.3)	55 (29.9)
4. I am afraid of being infected with coronavirus.	84 (45.7)	42 (22.8)	18 (9.8)	40 (21.7)
5. I think I may get coronavirus at any moment.	107 (58.2)	38 (20.6)	11 (6.0)	28 (15.2)
6. I think I have gotten the corona with every single sign and check myself.	121 (65.8)	27 (14.7)	11 (6.0)	25 (13.5)
7. I am worried about the transmission of the coronavirus to people around me.	44 (23.9)	31 (16.8)	32 (17.5)	77 (41.8)
8. Corona anxiety has disrupted my activities.	105 (57.0)	29 (15.8)	18 (9.8)	32 (17.4)
9. The media attention to corona worries me.	94 (51.1)	39 (21.2)	14 (7.6)	37 (20.1)
10. Thinking about corona has disturbed my sleep.	157 (85.3)	18 (9.8)	5 (2.7)	4 (2.2)
11. Thinking about corona has made me lose my appetite.	168 (91.3)	8 (4.3)	2 (1.1)	6 (3.3)
12. I get headache when I am thinking about corona.	160 (87.0)	15 (8.1)	4 (2.2)	5 (2.7)
13. My body trembles when I am thinking about corona.	157 (85.3)	16 (8.7)	5 (2.7)	6 (3.3)
14. When I am thinking about corona, I get goose bumps.	163 (88.6)	9 (4.9)	7 (3.8)	5 (2.7)
15. Corona has become a nightmare for me.	146 (79.3)	14 (7.6)	11 (6.0)	13 (7.1)
16. My physical activity has decreased due to the fear of corona.	126 (68.5)	22 (12.0)	17 (9.2)	19 (10.3)
17. It is difficult for me to talk about corona with others.	148 (80.3)	15 (8.2)	6 (3.3)	15 (8.2)
18. I get a heartbeat when I am thinking about corona.	158 (85.9)	12 (6.5)	6 (3.3)	8 (4.3)

Table 4. The correlation between COVID-19 related anxiety, mindfulness, and spiritual health among patients with cancer

Variable	Mean	Standard deviation	Minimum	Maximum	Spearman's rho correlation coefficient		
					COVID-19 anxiety	Mindfulness	Spiritual health
COVID-19 anxiety	12.15	11.50	0	50	1		
Mindfulness	40.52	7.84	17	56	0.09 (p=0.23)	1	
Spiritual health	91.58	14.01	35	120	0.12 (p=0.11)	0.47 (p<0.001)	1

cer specialists in caring for cancer patients has changed, without strong evidence and recommendations.⁴² This condition causes more anxiety in cancer patients.

Health care resources were mobilized to fight coronavirus infection. Cancer patients, their caregivers, and health care professionals do not know whether to continue treatment or wait for the COVID-19 pandemic to go away.⁴³ Büntzel et al.⁴⁴ also showed that nearly half of the participants (43% of patients and 47% of physicians) expected negative consequences for patients' physical condition, and that cancer patients felt emotional stress in 34% of their physicians. Cancer patients are concerned about COVID-19 and its effects.

The results of the present study showed that more than half of the cancer patients (59.3%) were concerned about the spread of COVID-19 disease in people around them and 40.2% of the participants were extremely concerned about the prevalence of the coronavirus infection. Coronavirus has become a nightmare in 13.1% of the participants. In addition to the problems caused by cancer, cancer patients experience worries about coronavirus as important challenges in their lives. These results indicate the effect of the COVID-19 outbreak on cancer patients and the continuation of treatment. Cancer patients' medical treatments and complication management must be proportional to their conditions and the epidemic pattern of the region.⁴⁵ Physicians can also help moderate patients' anxiety, use telemedicine to examine anxiety and fear of relapse, and provide appropriate psychological referrals.⁴⁶ Studies have shown that depression and anxiety are associated with impaired survival in cancer patients^{47,48} and early psychological interventions in cancer patients can lead to longer survival.⁴⁹

The results of the present study did not show a significant relationship between CDAS and mindfulness. Contrary to the results of the present study, Fong and Ho⁵⁰ showed positive effects of mindfulness on mental and psychological quality of the colorectal cancer patients by controlling symptoms and emotional distress such as anxiety. Lam et al.'s⁵¹ study showed that low mindfulness was associated with higher levels of symptoms of depression and anxiety, and that mindfulness might protect against psychological distress in cancer patients. This difference may be due to the different questionnaire used by Fong and Ho⁵⁰ (Hospital Anxiety and Depression Scale), which does not specifically address coronavirus anxiety and refers to hospital anxiety. The aforementioned study was also conducted before the onset of corona outbreak when patients were not involved with problems associated with corona. The corona outbreak may increase the levels of fear and anxiety in cancer patients and diminish the impact of mindfulness. These results highlight the profound impact of coronavirus on the anxiety of cancer patients, which can lead to future problems for them. Numerous studies have shown that mindfulness is associated with

reduced levels of anxiety and depression.⁵²⁻⁵⁵ Belen⁵⁶ found that fear of COVID-19 and anxiety were inversely related to mindfulness and that more mindfulness might protect individuals against the negative effects of fear of coronavirus, anxiety and depression, and improve mental health during the COVID-19 epidemic. Mindfulness refers to the awareness and acceptance of the presence. Although it may cause people to experience less negative symptoms and anxiety during the COVID-19 outbreak, given the specific circumstances of cancer patients and many problems associated with the disease, the mindfulness may not affect the anxiety of cancer patients alone. The use of two different questionnaires, sampling at different times in different populations with different prevalence of COVID-19 may be the reasons for different results in the present study and the Belen's study.⁵⁶ However, researchers have proposed mindfulness as a useful way to adapt to ongoing change and to cope with anxiety and depression during the coronavirus outbreak.⁵⁷ Further research is required because of the lack of research on the relationship between coronavirus anxiety and mindfulness and the profound effects of the coronavirus on cancer patients.

The present study did not show a significant relationship between CDAS and spiritual health. However, Abou Chaar et al.⁵⁸ showed that spirituality could reduce the levels of anxiety and depression in cancer patients. In addition, Rabow and Knish⁵⁹ showed that spiritual well-being reduced anxiety and depression. Musarezaie⁶⁰ also showed a statistically significant relationship between spiritual health and anxiety scores in cancer patients, i.e. patients with a tendency to spiritual life had lower anxiety. Spiritual beliefs are often considered as a source for dealing with illness and making decisions on treatment of the patients with chronic illness. Chen et al.⁶¹ showed that spiritual well-being was associated with reduced anxiety and depression. Health care providers need to pay more attention to spiritual care and help cancer patients with spiritual psychological counseling.

However, a relationship was observed between religious beliefs and adverse health outcomes in some patients. For example, the negative effects of religion (i.e., feelings of punishment and spiritual dissatisfaction) are associated with an increased risk of anxiety, depression, and poor quality of life.^{62,63} In the present study, cancer patients had good spiritual health (27.7%: high and 71.7%: moderate). In other words, the high spiritual health of the study population may not determine the relationship between spiritual health and coronavirus anxiety. It has also been reported that attending religious ceremonies and praying every day or more than once a day, patients gain more strength and peace of mind to cope with daily stressors.⁶⁴ COVID-19 disease crisis, reduced communication and quarantine can also be reasons that have affected cancer patients. The far-reaching effects of the corona outbreak can also affect the re-

ligious aspects and beliefs of cancer patients. Since the present study is the first one, which investigates the relationship between coronavirus anxiety and spiritual health, further research is needed to confirm these results.

Study limitations

Our study has some limitations in that should be addressed in future. The self-report results of the patients may not always reflect a valid level of psychological impact and anxiety of the cancer patients. The present study is a cross-sectional one that does not deal with the cause and effect relationship and future research should be in the form of longer longitudinal designs or interventional study. The specific condition of cancer patients and the long course of treatment can affect the variables of mindfulness, spiritual health and anxiety caused by coronavirus in these patients, so the results should be generalized with caution. To our knowledge, this is the first study, which examines the relationship between spiritual health and anxiety caused by coronavirus in cancer patients that needs to be investigated in future studies. These results were obtained from Iranian patients, which may not indicate the anxiety status of cancer patients outside Iran due to different cultures and social systems.

Clinical implications

The results of this study showed that the prevalence of COVID-19 caused anxiety and problems in cancer patients to continue their treatment. Therefore, cancer patients' conditions and the pattern of COVID-19 epidemic of the region must be considered to allocate proper medical treatments and manage the patients. Although in the present study, mindfulness and spiritual health were not associated with anxiety caused by coronavirus in cancer patients, these results should be considered in future studies and effective methods are required to reduce cancer patients' anxiety and prevent the long and lasting consequences.

In conclusion, the results of this study showed that cancer patients had high levels of mental and physical anxiety and their worries about the prevalence of coronavirus caused challenges in their lives. Mindfulness and spiritual health were not associated with anxiety caused by coronavirus in cancer patients. The results of this study can help identify levels of coronavirus anxiety and possible related factors for the development and recognition of future interventions, clinical guidance and planning in crises such as coronavirus.

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Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Mahlagha Dehghan. Data curation: Mahlagha Dehghan, Zakieh Namjoo, Ahmad Zarei, Hanieh Tajedini, Amir Bahrami. Formal analysis: Mahlagha Dehghan. Investigation: Mahlagha Dehghan, Zakieh Namjoo, Ahmad Zarei, Hanieh Tajedini, Amir Bahrami. Methodology: Mahlagha Dehghan. Project administration: Mahlagha Dehghan. Supervision: Mahlagha Dehghan. Validation: Mahlagha Dehghan. Visualization: Mahlagha Dehghan. Writing—original draft: Mohammad Ali Zakeri. Writing—review & editing: Mahlagha Dehghan, Mohammad Ali Zakeri.

ORCID iDs

Mahlagha Dehghan	https://orcid.org/0000-0002-4205-829X
Zakieh Namjoo	https://orcid.org/0000-0002-7345-4332
Ahmad Zarei	https://orcid.org/0000-0001-5335-3887
Hanieh Tajedini	https://orcid.org/0000-0003-1964-7237
Amir Bahrami	https://orcid.org/0000-0002-1908-3067
Mohammad Ali Zakeri	https://orcid.org/0000-0003-1500-391X

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