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Health Status of Iranian Healthcare Workers During the First Peak of COVID-19 Epidemic in a High-Incidence Area (South Khorasan Province, Iran)

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ABSTRACT

Background and Objective: The immediate spread of life-threatening diseases such as Coronavirus Disease 2019 (COVID-19) can put a great deal of strain on healthcare professionals. Considering the important role of healthcare workers during the epidemic and the impact of life-threatening diseases on them, this study aimed to assess the general health of healthcare workers during the first peak of COVID-19 epidemic in Iran, and to investigate the factors affecting health status of the study population.

Methods: In this prospective pre-post observational study, the healthcare workers of South Khorasan province, Iran formed the target population. Data collection was initiated on May 9th, 2020, which is between the two peaks of the epidemic in Iran (March 31th, and June 4th). In this study, 173 individuals were entered the study. The data collection tools included a 28-item version of the Goldberg Standard General Health Questionnaire (GHQ-28) and a demographic checklist. Data were entered into SPSS v.22 for analysis at the significance level of $P \leq 0.05$.

Findings: This study was conducted on 173 healthcare workers with an age range of 20-66 years and a mean and standard deviation (SD) of 35.2 ± 8.9 years. The mean total score of the GHQ-28 was 16.1 ± 7.9 one month before the COVID-19 epidemic, while it increased by 5.0 points and reached 21.1 ± 11.2 during the epidemic ($P < 0.001$, effect size = 31.0%). Adjusted R-squared values for the somatic symptoms, anxiety/insomnia, severe depression, and social dysfunction subscales and the GHQ-28 were 32.8%, 55.5%, 72.3%, 11.6%, and 38.4%, respectively.

Conclusion: The scores of the GHQ-28 and its four subscales raised significantly during the COVID-19 epidemic compared to the previous month, showing that the health status of healthcare workers was deteriorated. Also, rotational work shifts along with experiencing nonspecific symptoms of COVID-19 could adversely affect the health status of healthcare workers.

Keywords: Anxiety; COVID-19; COVID-19 Stress Syndrome; Health Personnel; Mental Health

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Introduction

Coronavirus Disease 2019 (COVID-19) is a combination of acute respiratory diseases that has occurred since December 2019 in Wuhan, Hubei Province, China. During this period, various aspects of the health of people all around the world, especially healthcare workers, have been affected (1). The COVID-19 epidemic also led to the changes in the referrals to the healthcare centers, which can affect the healthcare workers' burdens of different specialties (2, 3). Studies conducted during the Severe Acute Respiratory Syndrome (SARS) and Ebola Virus Disease epidemics have shown that the immediate spread of a life-threatening disease can put a great deal of strain on healthcare workers (4). Physical fatigue, the need for morally difficult decisions, and increased workload have significant effects on their physical and mental health. Thus, healthcare workers are prone to mental health problems such as anxiety, depression, and insomnia (5, 6).

Given the routes of SARS-CoV-2 transmission, the best way to prevent is frequent hand washing, using face masks, isolating confirmed and suspected cases of COVID-19, and vaccination (7, 8). Due to their low cost, personal protective equipment (PPE) is a suitable and economical option to reduce the spread rate of respiratory viruses during epidemics (9). A study of the Middle East Respiratory Syndrome (MERS) epidemic in Saudi Arabia found that 65-70% of healthcare workers always or frequently wore surgical or N95 masks (10). A study conducted during the COVID-19 epidemic in Uganda also found that the vast majority of healthcare workers follow the guidelines of infection prevention and control recommended by the WHO, including hand hygiene, social distancing, and using masks in high-risk situations. This study states that 93% of healthcare workers used masks when dealing with patients (11).

Regarding COVID-19-related clinical symptoms among healthcare workers, a study conducted during the epidemic in Italy found that a small percentage (5%) of healthcare workers have had mild flu-like symptoms, while 1.7 % of them have had other symptoms such as sore throat and runny nose (12). Also, in another study conducted in the early phase of the COVID-19 epidemic on Dutch healthcare workers, it was shown that 14% of staff had respiratory symptoms or a fever, which after testing revealed that 6% of them were contaminated with SARS-CoV-2. Also, 53% stated that they had a fever during their illness. Fever, cough, shortness of breath, myalgia, general malaise, headache, and chest pain were other common symptoms among these individuals (13).

Therefore, considering the impact of the activity of healthcare workers on the health of people in the community, and the therapeutic, economic, and social consequences of any problems in the general health of healthcare workers as the first groups associated with COVID-19, and also given that no study has been conducted on the general health of healthcare workers in Birjand University of Medical Sciences during the COVID-19 epidemic, it seems that access to their general health status is very important; which can help us in planning for preventing any problem as well as improving the quality of services provided. Therefore, this study was conducted on healthcare workers in the counties of South Khorasan province, Iran.

Methods

Study design

In this prospective pre-post observational study, the general health status was assessed before and during the first peak of COVID-19 epidemic in South Khorasan province, Iran. The target population was healthcare workers of different counties of South Khorasan province, Iran. Data collection was

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initiated on May 9th, 2020, which is between the two peaks of the epidemic in Iran (March 31th, and June 4th) (14). The inclusion criterion was having full consent to participate in the study and to work as a healthcare worker in the past one year, and the exclusion criterion was incomplete completion of the questionnaire. According to the study conducted by Khayeri et al., the scores of somatic symptoms, anxiety/insomnia, severe depression, and social dysfunction in nurses working in Iranian teaching hospitals were 7.99 ± 4.24, 7.36 ± 4.85, 3.02 ± 1.4 and 12.86 ± 3.38, respectively (15). According to the mentioned statistics and taking into account the distances of d=0.7, d=0.66, d=0.27 and d=1.15 for somatic symptoms, anxiety/insomnia, severe depression, and social dysfunction, respectively, the sample size for each subscale was obtained as 133, 206, 102, and 33 individuals, respectively. However, in this study, due to the limitations of the COVID-19 pandemic, only 173 individuals were entered the study. This study was approved by the Birjand University of Medical Sciences' Research Ethics Committee (Approval ID: IR.BUMS.REC.1399.055).

Data collection tools

The data collection tools included a demographic data checklist along with a 28-item version of the Goldberg Standard General Health Questionnaire (GHQ-28), which were provided as a web-based questionnaire (16). This questionnaire has been indicated suitable reliability and validity and psychometric characteristics, especially in Iranian population (17, 18). The detailed description of the GHQ-28 and its subscales has been mentioned in our previous study with the same methodology in the general population of South Khorasan province, Iran (19). The GHQ-28 was completed twice by the participants, one time considering the condition of the month before the start of the outbreak of COVID-19 in Iran (January 2019), and the other time considering the conditions at the time of completing the questionnaire. In addition to the GHQ-28 questions, demographic information including age, sex, service category, marital status, academic degree, length of service, work shift, close contact with confirmed COVID-19 cases, the status of use of PPE, and nonspecific symptoms of COVID-19 were collected.

Statistical analysis

The data were entered into SPSS v.22. Qualitative and quantitative data were reported as frequency percentage and mean ± standard deviation (SD), respectively. The normality was checked using Kolmogorov-Smirnov test. The Pearson test, t-test, and ANOVA with Tukey post hoc test were also performed. Linear regression was used in order to assess the relationship between the variables. The significance level was considered $P \leq 0.05$.

Results

This study was performed on 173 healthcare workers of Birjand University of Medical Sciences in different counties of South Khorasan province, Iran with an age range of 20-66 years and a mean ± SD of 35.2 ± 8.9 years. Among these individuals, 109 individuals (63.0%) were female. Eighty individuals (46.2%) have had close contact with confirmed COVID-19 patients. Also, 109 individuals (63.0%) served in the health services and 64 individuals (37.0%) served in other service fields. The range of length of service of healthcare workers was 1-32 years with an average of 10.7 ± 8.0 years. Out of 23 individuals who were tested for COVID-19 by the reverse transcription-polymerase chain reaction (RT-PCR) method, 2 individuals (8.7%) were positive. Also, nonspecific symptoms of COVID-19 were observed in 69 participants (39.9%), among which the most common symptoms were weakness (14.9%),

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headache (13.7%), and myalgia (11.2%) (Table 1). The results showed that nonspecific symptoms of COVID-19 were more common in individuals who were in close contact with confirmed cases of COVID-19 (52.5% vs. 29.0%, P = 0.002). Also, nonspecific symptoms of COVID-19 were observed in individuals with rotational shifts more than individuals with morning shifts (57.8% vs. 29.1%, P = 0.001). Individuals who served in medical services showed more nonspecific symptoms of COVID-19 than others. Nonspecific symptoms of COVID-19 were more common in those who did not use PPE (62.5% vs. 39.5%). Comparing individuals with nonspecific symptoms of COVID-19 to those without these symptoms, the mean scores of somatic symptoms and anxiety/insomnia subscales and the GHQ-28 were 2.1, 1.7, and 5.1 points higher, respectively (P <0.001, P = 0.027, and P = 0.002, respectively) (Table 2).

The results showed that 95.4% of the healthcare workers of Birjand University of Medical Sciences used PPE. Also, individuals who did not have nonspecific symptoms of COVID-19 were more likely to use PPE (97.1% vs. 92.8%). Moreover, 10.3% of the individuals working in the medical services did not use PPE, while 36.2% of the individuals working in the medical services used masks and gloves. Individuals who were in close contact with confirmed COVID-19 patients were more likely to use PPE (96.3% vs. 94.6%). The mean score of the somatic symptoms subscale in individuals who did not use PPE was 0.45 points higher than others. The mean scores of the social dysfunction subscale and the GHQ-28 in individuals who used masks were 0.25 and 2.18 points higher than others, respectively. The mean score of the severe depression subscale in individuals who used masks and gloves and who did not use PPE was 1.03 points higher and 0.97 points lower than others (Table 3).

According to the results, the mean total score of the GHQ-28 was 16.1 ± 7.9 one month before the COVID-19 epidemic, while it increased by 5.0 points and reached 21.1 ± 11.2 during the epidemic, which means that the status of the heath of individuals has been impaired during the epidemic (P <0.001, effect size = 31.0%). Among four subscales of the GHQ-28, the somatic symptoms subscale had the highest increase in score, so that before the epidemic it had a mean of 3.7 ± 2.5, while during the epidemic, it increased by an average of 1.9 points and reached a mean of 5.6 ± 2.9 (P <0/001, effect size = 51.3%). According to the results, 68.2% of the scores in the social dysfunction subscale were in the abnormal range. Also, the highest score change was related to the subscale of somatic symptoms in which 22.5% of the scores were included in the abnormal range. Individuals with scores in abnormal range in somatic symptoms, anxiety/insomnia, and severe depression subscales and the GHQ-28 were 32.9%, 38.1%, 12.1%, and 37.6%, respectively (Table 4).

In order to determine the factors affecting the scores of the GHQ-28 and its subscales, linear regression was performed with the presence of nonspecific symptoms of COVID-19, demographic and socio-economic variables, along with the score of the GHQ-28/subscale before the epidemic as a baseline. The results showed that nonspecific symptoms of COVID-19 could raise the score of the somatic symptoms subscale by 1 unit (β = 1.08, P = 0.01). Also, work shift along with other variables could raise the score of severe depression and anxiety/insomnia subscales and the GHQ-28 by 0.13, 0.46, and 0.73 points, respectively, which was statistically significant. The adjusted R-squared showed that the variables included in the model could clarify 72.3% of the variance of the severe depression subscale. It means that 72.3% of the dependent variable changes are allocated to the influence of variables included in the regression model, while 28.0% of the dependent variable changes are allocated to the influence of variables not included in the model or unmeasured variables. Adjusted R-squared values for somatic symptoms, anxiety/insomnia, and social dysfunction subscales and the GHQ-28 were 32.8%, 55.5%, 11.6%, and 38.4%, respectively (Table 5).

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Table 1. Demographic information and nonspecific symptoms of COVID-19 among the healthcare workers (N = 173)

Variables	Subgroups	Frequency (%)
Demographic information		
Age	20-30	47 (27.2)
	30-40	75 (43.3)
	40-50	40 (23.2)
	>50	11 (6.3)
Sex	Male	64 (37.0)
	Female	109 (63.0)
Monthly income (Million Rials)	<30	51 (29.5)
	30–70	111 (64.2)
	70–110	5 (2.9)
	110–150	3 (1.7)
	>150	1 (0.6)
Work shift	Morning	79 (45.7)
	Rotational	71 (41.0)
	Others	23 (13.3)
Close contact with confirmed COVID-19 cases	No	93 (53.8)
	Yes	80 (46.2)
Category of service	Medical services	58 (33.5)
	Health services	51 (29.5)
	Service occupations	9 (5.2)
	Education and research	13 (7.5)
	Official	14 (8.1)
	Others	28 (16.2)
Length of service (years)	0-10	75 (51.4)
	10-20	46 (31.5)
	20–30	20 (13.7)
	>30	5 (3.4)
Nonspecific symptoms of COVID-19		
	Without symptoms	104 (60.1)
	Fever	6 (3.7)
	Dry cough	16 (9.9)
	Shortness of breath	9 (5.6)
	Chest pain	7 (4.3)
	Weakness	24 (14.9)
	Myalgia	18 (11.2)
	Body aches	8 (5.0)
	Vomiting	1 (0.6)
	Diarrhea	9 (5.6)
	Headache	22 (13.7)
	Sore throat	17 (10.6)
	Loss of taste and smell	5 (3.1)
	Other symptoms related to COVID-19	1 (0.6)

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Table 2. Frequency of nonspecific symptoms of COVID-19 in healthcare workers based on demographic, and socio-economic factors, along with the subscales of GHQ-28

Variable	Subgroups (N)	Symptoms		P-value
		No	Yes	
Frequency				
Sex	**Male (64)**	37 (57.8)	27 (42.2)	0.635[a]
	Female (109)	67 (61.5)	42 (38.5)	
Marital status	**Single (25)**	12 (48.0)	13 (52.0)	0.080[a]
	Married (146)	92 (63.0)	54 (37.0)	
	Widow (2)	0 (0.0)	2 (100)	
Category of service	**Medical services (58)**	25 (43.1)	33 (56.9)	0.209[a]
	Health services (51)	33 (64.7)	18 (35.3)	
	Others (64)	46 (71.9)	18 (28.10)	
Using personal protective equipment	**No (8)**	3 (37.5)	5 (62.5)	0.740[a]
	Yes (157)	95 (60.5)	62 (39.5)	
Close contact with confirmed COVID-19 cases	**No (93)**	66 (71.0)	27 (29.0)	0.002[a]
	Yes (80)	38 (47.5)	42 (52.5)	
Work shift	**Morning (79)**	56 (70.9)	23 (29.1)	0.001[a]
	Rotational (71)	30 (42.2)	41 (57.8)	
	Others (23)	18 (78.3)	5 (21.7)	
Mean ± SD (GHQ-28)				
	Somatic symptoms	4.8 ± 2.4	6.9 ± 3.1	<0.001[b]
	Anxiety/insomnia	5.1 ± 4.4	6.8 ± 5.0	0.024[b]
	Social dysfunction	7.0 ± 2.8	7.4 ± 2.8	0.441[b]
	Severe depression	2.1 ± 3.1	3.2 ± 3.8	0.055[b]
	Total score of the GHQ-28	19.1 ± 10.3	24.2 ± 11.9	0.003[b]

a. Chi-square
b. T-Test

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Table 3. Use of personal protective equipment among the healthcare workers during the first peak of COVID-19 epidemic (N = 173)

Variables	Subgroups (N)	Not using personal protective equipment	Masks and gloves	Only masks	Masks, gloves, shields, and gowns	Other	P-value
Total		8 (4.6)	77 (44.5)	53 (30.6)	16 (9.2)	19 (11.0)	
Frequency (%)							
Sex	**Male (64)**	2 (3.1)	33 (51.6)	19 (29.7)	4 (6.2)	6 (9.4)	0.577[a]
	Female (109)	6 (5.5)	44 (40.4)	34 (31.2)	12 (11.0)	13 (11.9)	
Presence of COVID-19 nonspecific symptoms	**No (104)**	3 (2.9)	47 (45.2)	34 (32.7)	9 (8.6)	11 (10.6)	0.693[a]
	Yes (69)	5 (7.2)	30 (43.5)	19 (27.5)	7 (10.1)	8 (11.7)	
Category of service	**Medical services (58)**	6 (10.3)	21 (36.2)	19 (32.7)	8 (13.8)	4 (7.0)	0.212[a]
	Health services (51)	1 (2.0)	27 (52.9)	14 (27.4)	4 (7.8)	5 (9.9)	
	Others (64)	1 (1.6)	29 (45.3)	20 (31.3)	4 (6.2)	10 (15.6)	
Close contact with confirmed COVID-19 cases	**No (93)**	5 (5.4)	39 (41.9)	29 (31.3)	10 (10.7)	10 (10.7)	0.900[a]
	Yes (80)	3 (3.7)	38 (47.5)	24 (30)	6 (7.5)	9 (11.3)	
Mean ± SD (GHQ-28)							
	Somatic Symptoms	5.9 ± 3.8	5.7 ± 3.2	5.7 ± 2.8	5.3 ± 2.6	5.1 ± 1.9	0.902[b]
	Anxiety/insomnia	5.2 ± 3.4	5.7 ± 4.8	6.3 ± 5.2	5.1 ± 4.9	5.2 ± 3.6	0.823[b]
	Social dysfunction	6.9 ± 2.3	7.4 ± 3.1	7.4 ± 2.5	5.9 ± 3.1	6.4 ± 1.5	0.192[b]
	Severe depression	1.4 ± 1.6	3.0 ± 3.8	2.5 ± 3.5	2.5 ± 3.8	1.5 ± 1.7	0.383[b]
	Total score of the GHQ-28	19.4 ± 9.7	21.9 ± 12.1	22.0 ± 11.6	18.9 ± 12.0	18.1 ± 5.1	0.582[b]

a. Chi-square
b. ANOVA

Discussion

Being in critical situations such as the COVID-19 epidemic, which we are currently witnessing, can affect people's health status. In this study, the GHQ-28 was used to assess the general health status of healthcare workers. As expected, the GHQ-28 and its subscales changed during the COVID-19 epidemic compared to one month before the epidemic, and the mean scores obtained were increased; in other words, the health status of healthcare workers was deteriorated during the epidemic. Although the mean score of the GHQ-28 increased by 5.0 points during the epidemic but based on the cut-off point of 22, the mean was within the normal range. The lack of significant changes in general health status may be due to high spiritual health in the study population (20). In general, the findings of this study showed that the mean scores of the GHQ-28 subscales, except the subscale of social dysfunction, were in the normal range before and during the epidemic. Although as expected, the mean score in each subscale increased.

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In order to investigate the effect of the epidemic on health, it is important to determine the changes in the score of subscales. The present study showed that the anxiety/insomnia subscale had the highest score increment, which was similar to researches conducted on medical staff in China during the SARS epidemic (21, 22). Increased anxiety during an epidemic of infectious diseases among healthcare workers is predictable and preventable and should be considered as it has various effects on the healthcare workers (23-27). The prevalence of anxiety symptoms among healthcare workers was lower compared to a similar study during the SARS epidemic in Saudi Arabia. This finding could be related to the timing of the studies; the present study was conducted after the initial peak of the epidemic (during the epidemic), while the study of the SARS epidemic was conducted one year after the epidemic (10).

The score of the severe depression subscale was the lowest compared to other subscales and did not show a significant increment during the epidemic, which could be related to the spiritual health of the study population (28). In a similar study during the SARS epidemic in southern Taiwan, the psychological problems caused by the infectious disease epidemic were far greater. This finding can be attributed to cultural differences, the higher spiritual health of the Iranian study population, and differences in the severity of the disease in the two regions (28). The score of the social dysfunction subscale did not show great changes during the epidemic and was more influenced by the score of before the epidemic, and the increase in the score of this subscale was consistent with a similar study (10). The score of the somatic symptoms subscale also increased during the epidemic compared to one month before the epidemic, which could be due to the increased susceptibility of individuals to COVID-19, having symptoms related to COVID-19, and close contact with confirmed COVID-19 cases.

In the present study, according to similar studies in Iran and China, the mean scores of severe depression and anxiety/insomnia subscales and the GHQ-28 were higher in women and single individuals (4, 6, 29-30). Similar studies in Iran and Hong Kong have shown that the closer a person is in contact with confirmed COVID-19 cases, the more negatively their general health and depression can be affected, which is similar to the current study. The general theory is that closer contact with the patients increases the risk of depression (4, 29, 31). Due to the closer contact of healthcare workers in medical centers and hospitals with COVID-19 cases, as expected, mental health in these people was worse than other individuals working in the healthcare system. This finding was similar to studies during the COVID-19 and SARS epidemic in China (30, 32). The results indicate that medical staff had higher social dysfunction scores. This finding is worrying and should be considered due to the job sensitivity of medical staff and their vital role during the epidemic. According to a similar study, another variable that can affect health status is age and length of service, which was consistent with our study (29). According to the results, individuals younger than 40 years old showed a worse state of mental health, especially depression, which was similar to other studies in this field (4, 6). Instability and unfavorable mental health status in the working population indicate the importance of paying attention to mental health during the COVID-19 epidemic and other life-threatening situations.

According to the results and according to a similar study, weakness, headache, myalgia, sore throat, and dry cough were the most common nonspecific symptoms of COVID-19 (33, 34). Individuals who used PPE and individuals with rotational shifts showed less and more nonspecific symptoms of COVID-19, respectively. According to similar studies in Saudi Arabia and Taiwan during the SARS epidemic, people who showed nonspecific symptoms of COVID-19 had more symptoms of depression and anxiety, and their mental health was more at risk (10, 35). Contrary to expectations, the use of PPE in people working in the medical services was lower than others, which may be due to the lack of awareness of the role of PPE in the prevention of COVID-19. According to another study, there is a direct relationship between awareness of the role of PPE in the prevention of diseases and its use by medical staff (36). The scores of somatic symptoms and severe depression subscales were higher and lower in individuals who did not use PPE, respectively. The association of low scores of severe depression subscale with not using PPE suggests that those who did not use PPE may not have taken the epidemic seriously, so they were less concerned about the situation, and were less likely to suffer from depression.

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Also, individuals who used PPE had higher scores of anxiety/insomnia subscale, so using PPE indicates their anxiety and worry about getting sick. The results showed that individuals who did not use PPE had better general health status. Of course, this finding cannot be a reason for not taking the epidemic seriously, and not following health protocols, because it will lead to the spread of the epidemic and worsens the situation.

Strengths and limitations

The study was a prospective pre-post observational study. Thus, it is possible to measure the role of the COVID-19 epidemic by comparing the findings of the two conditions, "before the epidemic" and "after the epidemic." According to the trend of the COVID-19 epidemic in Iran, this study was performed after the end of the first peak of the disease and before the beginning of the second peak. Therefore, this study could well show the role of the epidemic. On the other hand, due to the short time between the onset of the epidemic, the bias in answering questions of "before the epidemic" condition was reduced. However, this study is limited due to the cross-sectional nature of the study.

Conclusion

In conclusion, this study showed that the scores of the GHQ-28 and its subscales increased significantly during the COVID-19 epidemic compared to one month before the initiation of the outbreak, showing that the health status of healthcare workers deteriorated due to the epidemic. This study also revealed that rotational work shifts along with experiencing nonspecific symptoms of COVID-19 could adversely affect the health status of healthcare workers.

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Authors' Contributions

Conceptualization: [Ali Fanoodi, Soroush Khojasteh-Kaffash]; Methodology: [Ali Fanoodi, Soroush Khojasteh-Kaffash, Reza Dastjerdi, Seyed Mohammad Riahi]; Formal analysis and investigation: [Ali Fanoodi, Soroush Khojasteh-Kaffash]; Writing - original draft preparation: [Ali Fanoodi, Soroush Khojasteh-Kaffash]; Writing - review and editing: [Ali Fanoodi, Soroush Khojasteh-Kaffash, Seyed Mohammad Riahi, Reza Dastjerdi, Farnaz Mozayani]; Supervision: [Seyed Mohammad Riahi, Reza Dastjerdi].

Compliance with Ethics Guidelines

This study was approved by Birjand University of Medical Science's Research Ethics Committee (Approval ID: IR.BUMS.REC.1399.055). Moreover, informed consent was received from all participants.

Consent to participate

Informed consent was obtained from all participants.

Consent for Publication

Not applicable.

Data Availability

Not applicable.

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Code availability

Not applicable.

Competing Interests

The authors have no conflicts of interest. Authors also indicate that they did not have a commercial relationship with the organization that sponsored the research and had full control of all primary data and agree to allow the journal to review their data if requested.

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