ORIGINAL ARTICLE

Mental Health Status of Healthcare Workers During the Coronavirus Disease 2019 Pandemic: A Survey of Hospitals in Shiraz, Iran

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Abstract

Background: Healthcare workers (HCWs) directly or indirectly involved in the coronavirus disease 2019 (COVID-19) treatment process may experience severe mental consequences of the pandemic. Hence, this study aimed to evaluate the mental health status of HCWs in hospitals affiliated with Shiraz University of Medical Sciences, Iran. **Materials and Methods:** This cross-sectional study was performed on 503 HCWs from five hospitals in Shiraz, including one COVID-19 front-line hospital, two COVID-19 second-line hospitals, and two without COVID-19 wards. Then, to assess the levels of anxiety, depression, insomnia, and post-traumatic stress disorder (PTSD) among HCWs, the Persian versions of the Hospital Anxiety and Depression Scale (HADS), Insomnia Severity Index (ISI), and Global Psychotrauma Screen (GPS) questionnaires were placed, respectively. **Results:** The mean age of participants was 33.94±8.26 years, and 252 (50.1%) were females. Anxiety, depression, insomnia, and moderate to high levels of PTSD were observed in 40.4%, 37.8%, 24.5%, and 71% of participants, respectively. A history of mental disorders was associated with all four outcomes (P<0.05). Females gender and living with elderly and/or children were correlated with anxiety and PTSD (P<0.05). Working at COVID-19 front- and second-line hospitals were similarly linked to higher insomnia and PTSD levels (P<0.05). Also, working in COVID-19 wards or non-clinical settings was associated with anxiety and depression (P<0.05). **Conclusion:** Most of the HCWs in this study may experience mental difficulties. Some factors may increase their risk of experiencing these difficulties. Hence, in the crisis era, mental health monitoring and identification of groups with predisposing factors are required to provide appropriate care as quickly as feasible.**[GMJ.2023;12:e2512] DOI:10.31661/gmj.v12i.2512**

Keywords: COVID-19; Health Care Workers; Mental Health; Anxiety; Depression; Insomnia; Post-Traumatic Stress Disorder

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Introduction

In December 2019, a highly infectious acute respiratory syndrome caused by a novel coronavirus (SARS-CoV-2) was identified in Wuhan, China. On March 11, 2020, the World Health Organization declared coronavirus disease 2019 (COVID-19) a pandemic [1].

Nowadays, the pandemic is undoubtedly one of the most stressful events, which poses a significant challenge to the social, economic, and, above all, the psychological resources of the populations [2-4].

Due to their direct contact with the disease, healthcare workers (HCWs) are concerned about disease transmission to their families. Lack of personal protective equipment in healthcare departments and long working hours make them especially vulnerable to emotional distress during the current COVID-19 pandemic [5].

Unfortunately, there have been reports of suicide among HCWs due to the psychological pressures of the pandemic [6]. The mental well-being of HCWs can significantly impact their ability to provide standard services for patients and the efficiency of the healthcare system, especially in situations such as the current pandemic [7].

In a study in Italy, among HCWs who were directly or indirectly engaged in providing care to COVID-19 patients, depression was reported in 24.73%, anxiety in 19.8%, insomnia in 8.27%, and post-traumatic stress disorder (PTSD) in 49.38% [8].

Also, younger age, female gender, working in front-line hospitals, and having a colleague deceased or hospitalized due to COVID-19 were associated with more mental health symptoms [8].

However, Lai *et al.* [9] showed that the prevalence of depression, anxiety, insomnia, and PTSD was observed in 50.4%, 44.6%, 34%, and 71.5% of HCWs, respectively. Also, female gender, and working in front-line hospitals were associated with increased mental health disorders [9].

In addition, a systematic review by Muller *et al.* showed that the impact of the COVID-19 pandemic on the mental health of HCWs was not limited to those working in the front-line hospital, and HCWs in various fields, positions, and exposure risks were presented with mental disorders [10].

Another study in Italy showed that prolonged presence in front-line COVID-19 hospitals was associated with increased mental health symptoms [11]. Also, symptoms of depression, anxiety, and insomnia diminished among HCWs from the pandemic onset over time [11].

Iran is one of the countries most affected by the COVID-19 pandemic, and its first wave was reported in late March 2020 [12]. Since then, five other waves have been officially reported, and the sixth and final wave–during which this study was performed–was caused by the relatively more contagious variant of Omicron (B.1.1.529) [13].

From the beginning of the pandemic in Iran, the Iranian health policymakers decided to dedicate some hospitals permanently and exclusively to patients, which caused the HCWs of these hospitals constantly exposed to COVID-19 (the group with consistent exposure).

Despite this decision, during the peaks of the disease, authorities had to transform some wards of other hospitals into COVID-19 units to increase the hospitalization capacity of patients.

Naturally, as a wave subsided, these wards returned to their former state.

As a result, HCWs of such units were only exposed to COVID-19 patients at certain times (the group with episodic exposure).

Although some other studies in Iran have tried to evaluate the impact of the COVID-19 pandemic on the mental health of the HCWs, to the best of our knowledge, no other study has tried to evaluate the mental health status of HCWs in Shiraz hospitals.

Furthermore, as far as we are aware, no other study in Iran has compared front- and second-line hospitals with and without COVID-19 wards.

In addition, few studies focused on assessing the mental health of the hospital staff who work in non-clinical sectors (such as administrative, security, and maintenance staff). Therefore, this study aimed to evaluate the impact of being directly or indirectly engaged in treating patients on the mental health status of HCWs in Shiraz hospitals.

Materials and Methods

Study Design
In this cross-sectional study, five hospitals in Shiraz city, including Ali-Asghar, Namazi, Faghihi, Hafez, and Dastgheib hospitals, all affiliated with Shiraz University of Medical Sciences, were selected.

Ali-Asghar hospital is the front-line COVID-19 hospital in Shiraz, and its staff has been continuously exposed to COVID-19 patients during the past two years.

Due to the insufficient capacity of Ali-Asghar hospital at the peak of COVID-19 waves, it was decided to temporarily allocate some wards of Namazi and Faghihi hospitals (as the second-line COVID-19 hospitals) for COVID-19 patients.

Consequently, during some episodes over the past two years, some hospital staff were directly exposed to COVID-19 patients. Also, Dastgheib and Hafez hospitals have no COVID-19 wards.

Participants
Based on the Rayani *et al*. study [14], 40% of healthcare experienced moderate and high levels of anxiety; the sample size was calculated as 276 (α=0.05, β=0.8, and d=0.06). For more accuracy, the sample size was considered as 503.

Random stratified sampling was used to recruit 142 participants from Namazi, 140 from Faghihi, 120 from Ali-Asghar, 51 from Hafez, and 50 from Dastgheib hospitals, from February 1 to February 20, 2022, in the middle of the sixth wave of COVID-19 in Iran caused by the Omicron variant.

Also, HCWs younger than 18 or older than 65 years were excluded from the study. Participants answered a mental health assessment questionnaire in their workplace hospital with a trained interviewer.

Data Collection
The baseline characteristics of participants included gender, age, educational level, occupation, marital status, living with children (under ten years old), living with the elderly (over 60 years old), experiencing the death of relatives or colleagues from COVID-19, history of psychiatric disorders, workplace hospital, and workplace ward of HCWs.

Then, to assess the levels of anxiety, depression, insomnia, and PTSD among HCWs, the Hospital Anxiety and Depression Scale (HADS) [15], Insomnia Severity Index (ISI) [16], and Global Psychotrauma Screen (GPS) questionnaires were applied, respectively.

Kaviani *et al*. [17] proved the validity and reliability of the 14-item HADS questionnaire and determined specific cut-off points, considering the cultural differences of the Iranian population.

Also, the reliability and validity of the Persian ISI questionnaire were proved by Yazdi *et al*. [18].

Also, the reliability and validity of the Persian version of the 22-item GPS questionnaire were proved by Haghi *et al*. [19].

The GPS questionnaire scores were interpreted through a specific statistical method (latent class analysis) to categorize participants with the same pattern of responses to three groups with low, moderate, and high levels of PTSD.

Ethical Considerations
This study was approved by the Research Ethics Committee of Shiraz University of Medical Sciences (approval code: IR.sums.med.rec.1400.572).

At the beginning of the interview, after explaining the research objectives, written informed consent was obtained from all participants. The questionnaires were completed anonymously, preserving all the principles of confidentiality.

Statistical Analysis
A data-driven approach was used to categorize the level of PTSD assessed by the GPS questionnaire.

A latent class analysis (LCA) was employed to categorize participants with the same pattern of responses to questionnaires. The LCA assigns an individual to a class by examining the pattern of categorical data using probabilistic methods.

Briefly, in the first step, several non-inclusive classes with homogeneous participants were defined. Then, LCA was done with the number of classes from 2 to 10.

The lower Bayesian information criterion (BIC), Akaike's information criterion (AIC),

and clinical interpretability determined the number of extracted GPS classes. Therefore, three classes for GPS with the lowest level of BIC to ease the interpretation were selected. Latent GOLD (version 5.0.0) was used to perform LCA.

Also, IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, NY., USA) was used to perform all statistical analyses. Quantitative and qualitative variables were described by mean±standard deviation (SD) and frequency (percent), respectively.

Univariate and multiple logistic regressions were performed to compute the odds ratio (OR) and the corresponding 95% confidence interval (CI) for demographic features, COVID-19 infection death, psychiatric disorder, hospital features with anxiety, depression, and insomnia. A P-value less than 0.05 was considered as statistically significant.

Results

Of the 503 participants, 252 (50.1%) were female, and the mean age was 33.94±8.26 years (ranged 20-60 years). The frequency of anxiety, depression, and insomnia was 40.4%, 37.78%, and 24.5 %, respectively.

Additionally, based on the LCA method with three classes, 146 (29%), 249 (49.5%), and 108 (21.5%) participants had low, moderate, and high levels of PTSD, respectively. The class with a low level of PTSD had a mean score of 2.52±1.4 and a median of 2 (ranged zero to 6). The class with a moderate level of PTSD had a mean score of 8.11±1.95 and a median of 8 (range 4 to 11).

The mean score of the class with a high level of PTSD was 14.10±2.15, with a median of 14 (range 11 to 21). The reliability of HADS, ISI, and GPS questionnaires were 0.886, 0.919, and 0.826, respectively.

Mental Health Status
1. Anxiety
Based on univariate logistic regression, gender (female: OR=1.72), occupational (non-clinical staff vs. physician: OR=1.82), living with the elderly (OR=1.57), death from COVID-19 in the relatives (OR=2.81), positive history of psychiatric disorders (OR=2.66), workplace hospital (Ali-Asghar vs. Hafez: OR=2.73),

and workplace ward (working in COVID-19 wards vs. non-COVID-19 wards: OR=4.07; working only in non-clinical sectors vs. working in non-COVID-19 wards: OR=3.04) were significantly associated with anxiety (Table-1).

However, as mentioned in Table-1, in multiple logistic regression, gender (female: OR=2.49), living with the elderly (OR=1.88), positive history of psychiatric disorders (OR=3.6), and workplace ward were significantly associated with anxiety.

2. Depression
Based on univariate logistic regression, age (OR=2.12), occupation (non-clinical staff vs. physician: OR=1.85), living with children) (OR=1.53), positive history of psychiatric disorders (OR=1.73), workplace hospital (Ali-Asghar vs. Hafez: OR=3.14), and workplace ward were significantly associated with depression (Table-2).

Also, in multiple logistic regression, level of education, positive history of psychiatric disorders, and workplace ward were significantly associated with depression (Table-2).

3. Insomnia
As shown in Table-3, univariate logistic regression revealed that death from COVID-19 in the relatives, positive history of psychiatric disorders, workplace hospital, and workplace ward) were significantly associated with insomnia.In addition, multiple logistic regression indicated that level of education, positive history of psychiatric disorders, and workplace hospital were significantly associated with insomnia (Table-3).

4. PTSD
Based on multinomial logistic regression, living with children (OR=2.27), living with the elderly (OR=2.09), positive history of psychiatric disorders (OR=3.13), and workplace ward were significantly associated with a moderate level of PTSD (Table-4).

However, the high level of PTSD was significantly associated with gender (female: OR=3.8), living with children (OR=2.92), working night shifts (OR=5.45), positive history of psychiatric disorders (OR=5.45), and workplace hospital (Table-4).

Table 1. Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Anxiety among HCWs

Variables		Anxiety					
		No or mild n(%)	Moderate to High n(%)	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Gender	Female	134 (53.17)	118 (46.83)	1.72 (1.2-2.47)	0.003	2.49 (1.45-4.28)	0.001
	Male	166 (66.14)	85 (33.86)	1	-	1	-
Age (year)	Less than 30	125 (60.1)	83 (39.9)	1	-	1	-
	30-50	116 (60.42)	76 (39.58)	0.99 (0.66-1.47)	0.948	0.88 (0.41-1.89)	0.739
	More than 50	59 (57.28)	44 (42.72)	1.12 (0.7-1.81)	0.635	1.14 (0.49-2.66)	0.756
Education level	High school diploma and lower	32 (59.26)	22 (40.74)	1	-	1	-
	Academic education	268 (59.69)	181 (40.31)	1.02 (0.57-1.81)	0.952	0.5 (0.22-1.11)	0.089
Occupation	Physician	47 (70.15)	20 (29.85)	1	-	1	-
	Nurse	112 (60.22)	74 (39.78)	1.55 (0.85-2.83)	0.151	0.79 (0.33-1.91)	0.6
	Non-clinical staff	141 (56.4)	109 (43.6)	1.82 (1.02-3.24)	0.044	0.65 (0.2-2.06)	0.458
Marital status	Single	116 (57.14)	87 (42.86)	1	-	1	-
	Married	184 (61.33)	116 (38.67)	1.19 (0.83-1.71)	0.347	1.34 (0.73-2.49)	0.348
Living with children	No	183 (59.61)	124 (40.39)	1	-	1	-
	Yes	117 (59.69)	79 (40.31)	1 (0.7-1.45)	0.985	0.93 (0.52-1.66)	0.809

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continue of **table 1.** Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Anxiety among HCWs

		No	Yes	OR (CI)	P	OR (CI)	P
Death from COVID-19 in the relatives	No	294 (60.49)	192 (39.51)	1	-	1	-
	Yes	6 (35.29)	11 (64.71)	2.81 (1.02-7.72)	0.045	1.89 (0.47-7.65)	0.371
Death from COVID-19 in the colleagues	No	266 (60.32)	175 (39.68)	1	-	1	-
	Yes	34 (54.84)	28 (45.16)	1.25 (0.73-2.14)	0.411	1.05 (0.52-2.11)	0.898
Night shift	No	19 (54.29)	16 (45.71)	1	-	1	-
	Yes	213 (61.38)	134 (38.62)	0.75 (0.37-1.5)	0.414	0.89 (0.38-2.06)	0.783
History of psychiatric disorders	No	236 (66.67)	118 (33.33)	1	-	1	-
	Yes	64 (42.95)	85 (57.05)	2.66 (1.79-3.93)	<0.001	3.6 (2.1-6.18)	<0.001
Workplace Hospital	Namazi	88 (61.97)	54 (38.03)	1.62 (0.8-3.27)	0.177	1.7 (0.66-4.39)	0.275
	Faghihi	83 (59.29)	57 (40.71)	1.82 (0.9-3.66)	0.096	1.26 (0.48-3.33)	0.639
	Ali-Asghar	59 (49.17)	61 (50.83)	2.73 (1.34-5.57)	0.006	1.08 (0.36-3.21)	0.895
	Dastgheib	33 (66)	17 (34)	1.36 (0.58-3.18)	0.476	1.55 (0.53-4.52)	0.42
	Hafez	37 (72.55)	14 (27.45)	1	-	1	-
Workplace ward	Constantly working in COVID-19 wards	57 (48.72)	60 (51.28)	4.07 (2.08-7.98)	<0.001	6.14 (2.23-16.89)	<0.001
	Episodically working in COVID-19 wards	64 (65.98)	33 (34.02)	1.99 (0.98-4.04)	0.055	2.31 (1-5.34)	0.049
	Working in non-clinical sectors	121 (56.02)	95 (43.98)	3.04 (1.62-5.69)	0.001	4.96 (1.69-14.58)	0.004
	Working in non-COVID-19 wards	58 (79.45)	15 (20.55)	1	-	1	-

CI: Confidence interval; **OR:** Odds ratio

Table 2. Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Depression among HCWs.

Variables		Depression		Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
		No or mild n(%)	Moderate to High n(%)				
Gender	Female	163 (64.68)	89 (35.32)	0.81 (0.57-1.16)	0.26	1.15 (0.67-1.96)	0.617
	Male	150 (59.76)	101 (40.24)	1	-	1	-
Age, y	Less than 30	144 (69.23)	64 (30.77)	1	-	1	-
	30-50	116 (60.42)	76 (39.58)	1.47 (0.98-2.23)	0.07	0.82 (0.39-1.72)	0.594
	More than 50	53 (51.46)	50 (48.54)	2.12 (1.31-3.45)	<0.001	0.75 (0.32-1.71)	0.489
Education level	High school diploma and lower	28 (51.85)	26 (48.15)	1	-	1	-
	Academic education	285 (63.47)	164 (36.53)	0.62 (0.35-1.09)	0.1	0.45 (0.2-0.98)	0.046
Occupation	Physician	47 (70.15)	20 (29.85)	1	-	1	-
	Nurse	126 (67.74)	60 (32.26)	1.12 (0.61-2.05)	0.72	0.53 (0.21-1.29)	0.159
	Non-clinical staff	140 (56)	110 (44)	1.85 (1.03-3.3)	0.04	0.43 (0.13-1.35)	0.148
Marital status	Single	134 (66.01)	69 (33.99)	1	-	1	-
	Married	179 (59.67)	121 (40.33)	1.31 (0.91-1.9)	0.15	1.02 (0.55-1.89)	0.96
Living with children	No	203 (66.12)	104 (33.88)	1	-	1	-
	Yes	110 (56.12)	86 (43.88)	1.53 (1.06-2.21)	0.02	1.47 (0.84-2.6)	0.179
Living with the elderly	No	241 (63.09)	141 (36.91)	1	-	1	-
	Yes	72 (59.5)	49 (40.5)	1.16 (0.77-1.77)	0.48	1.07 (0.58-1.97)	0.836
Living with the elderly	No	238 (62.3)	144 (37.7)	1	-	1	-
	Yes	62 (51.24)	59 (48.76)	1.57 (1.04-2.38)	0.031	1.88 (1.03-3.44)	0.041

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continue of **table 2.** Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Depression among HCWs.

Variable	Category						
Death from COVID-19 in the relatives	No	305 (62.76)	181 (37.24)	1	-	1	-
	Yes	8 (47.06)	9 (52.94)	1.9 (0.72-5)	0.2	0.92 (0.23-3.65)	0.908
Death from COVID-19 in the colleagues	No	281 (63.72)	160 (36.28)	1	-	1	-
	Yes	32 (51.61)	30 (48.39)	1.65 (0.97-2.81)	0.07	1.88 (0.97-3.63)	0.06
Night shift	No	23 (65.71)	12 (34.29)	1	-	1	-
	Yes	226 (65.13)	121 (34.87)	1.03 (0.49-2.13)	0.95	1.27 (0.55-2.94)	0.569
History of psychiatric disorders	No	234 (66.1)	120 (33.9)	1	-	1	-
	Yes	79 (53.02)	70 (46.98)	1.73 (1.17-2.55)	0.01	2.16 (1.28-3.66)	0.004
Workplace hospital	Namazi	89 (62.68)	53 (37.32)	1.94 (0.93-4.02)	0.08	1.24 (0.47-3.27)	0.668
	Faghihi	89 (63.57)	51 (36.43)	1.86 (0.9-3.88)	0.1	1.07 (0.4-2.86)	0.895
	Ali-Asghar	61 (50.83)	59 (49.17)	3.14 (1.5-6.58)	<0.001	2.11 (0.71-6.25)	0.177
	Dastgheib	35 (70)	15 (30)	1.39 (0.57-3.38)	0.460	1.29 (0.43-3.83)	0.653
	Hafez	39 (76.47)	12 (23.53)	1	-	1	-
	Constantly working in COVID-19 wards	63 (53.85)	54 (46.15)	3.96 (1.96-7.98)	<0.001	2.9 (1.05-8)	0.04
	Episodically working in COVID-19 wards	69 (71.13)	28 (28.87)	1.87 (0.89-3.94)	0.1	1.64 (0.7-3.82)	0.254
Workplace ward	Working in non-clinical sectors	121 (56.02)	95 (43.98)	3.62 (1.88-6.99)	<0.001	3.25 (1.13-9.36)	0.029
	Working in non-COVID-19 wards	60 (82.19)	13 (17.81)	1	-	1	-

CI: Confidence interval; **OR:** Odds ratio

Table 3. Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Insomnia among HCWs.

Variables		Insomnia		Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
	No n(%)	Yes n(%)					
Gender	Female	197 (78.17)	55 (21.83)	0.75 (0.5-1.13)	0.17	1.11 (0.62-1.99)	0.73
	Male	183 (72.91)	68 (27.09)	1	-	1	-
Age, y	Less than 30	157 (75.48)	51 (24.52)	1	-	1	-
	30-50	149 (77.6)	43 (22.4)	0.89 (0.56-1.41)	0.617	0.84 (0.37-1.94)	0.685
	More than 50	74 (71.84)	29 (28.16)	1.21 (0.71-2.06)	0.49	1.1 (0.44-2.74)	0.84
Education level	High school diploma and lower	36 (66.67)	18 (33.33)	1	-	1	-
	Academic education	344 (76.61)	105 (23.39)	0.61 (0.33-1.12)	0.111	0.42 (0.18-0.98)	0.045
Occupation	Physician	52 (77.61)	15 (22.39)	1	-	1	-
	Nurse	144 (77.42)	42 (22.58)	1.01 (0.52-1.98)	0.974	1.09 (0.41-2.9)	0.861
	Non-clinical staff	184 (73.6)	66 (26.4)	1.24 (0.66-2.36)	0.504	0.95 (0.27-3.36)	0.938
Marital status	Single	150 (73.89)	53 (26.11)	1	-	1	-
	Married	230 (76.67)	70 (23.33)	0.86 (0.57-1.3)	0.478	0.66 (0.33-1.31)	0.231
Living with children	No	235 (76.55)	72 (23.45)	1	-	1	-
	Yes	145 (73.98)	51 (26.02)	1.15 (0.76-1.74)	0.514	1.55 (0.81-2.94)	0.186
Living with the elderly	No	292 (76.44)	90 (23.56)	1	-	1	-
	Yes	88 (72.73)	33 (27.27)	1.22 (0.76-1.94)	0.408	1.26 (0.66-2.4)	0.487
Death from COVID-19 in the relatives	No	371 (76.34)	115 (23.66)	1	-	1	-
	Yes	9 (52.94)	8 (47.06)	2.87 (1.08-7.6)	0.034	1.78 (0.42-7.62)	0.435

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continue of **table 3.** Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with Insomnia among HCWs

Death from COVID-19 in the colleagues	No	336 (76.19)	105 (23.81)	1	-	1	-
	Yes	44 (70.97)	18 (29.03)	1.31 (0.73-2.36)	0.371	1.2 (0.58-2.5)	0.619
Night shift	No	25 (71.43)	10 (28.57)	1	-	1	-
	Yes	258 (74.35)	89 (25.65)	0.86 (0.4-1.87)	0.707	1.15 (0.46-2.86)	0.77
History of psychiatric disorders	No	284 (80.23)	70 (19.77)	1	-	1	-
	Yes	96 (64.43)	53 (35.57)	2.24 (1.46-3.43)	<0.001	3.67 (2.09-6.44)	<0.001
Workplace hospital	Namazi	113 (79.58)	29 (20.42)	2.36 (0.86-6.48)	0.095	4.03 (1.02-15.97)	0.047
	Faghihi	98 (70)	42 (30)	3.94 (1.46-10.62)	0.007	6.18 (1.56-24.44)	0.009
	Ali-Asghar	87 (72.5)	33 (27.5)	3.49 (1.28-9.55)	0.015	4.63 (1.06-20.25)	0.042
	Dasgheib	36 (72)	14 (28)	3.58 (1.18-10.86)	0.024	7.48 (1.76-31.85)	0.006
	Hafez	46 (90.2)	5 (9.8)	1	-	1	-
Workplace ward	Constantly working in COVID-19 wards	81 (69.23)	36 (30.77)	2.8 (1.29-6.07)	0.009	1.78 (0.59-5.44)	0.308
	Episodically working in COVID-19 wards	75 (77.32)	22 (22.68)	1.85 (0.82-4.19)	0.142	1.32 (0.52-3.35)	0.561
	Working in non-clinical sectors	161 (74.54)	55 (25.46)	2.15 (1.03-4.48)	0.041	2.14 (0.66-6.89)	0.205
	Working in non-COVID-19 wards	63 (86.3)	10 (13.7)	1	-	1	-

CI: Confidence interval; **OR**: Odds ratio

Table 4. Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with PTSD among HCWs.

Variables		PTSD			Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
		Low n(%)	Moderate n(%)	High n(%)				
Gender	Female	60 (23.81)	62 (24.6)	130 (51.59)	1.43 (0.77-2.68)	0.257	3.8 (1.7-8.47)	0.001
	Male	48 (19.12)	84 (33.47)	119 (47.41)	1	-	1	-
Age, y	Less than 30	55 (26.44)	57 (27.4)	96 (46.15)	1	-	1	-
	30-50	39 (20.31)	57 (29.69)	96 (50)	2.18 (0.83-5.76)	0.116	0.86 (0.21-3.42)	0.827
	More than 50	14 (13.59)	32 (31.07)	57 (55.34)	0.79 (0.39-1.62)	0.52	0.61 (0.24-1.52)	0.288
Education level	High school diploma and lower	10 (18.52)	17 (31.48)	27 (50)	1	-	1	-
	Academic education	98 (21.83)	129 (28.73)	222 (49.44)	0.91 (0.36-2.31)	0.841	0.65 (0.19-2.29)	0.504
Occupation	Physician	21 (31.34)	22 (32.84)	24 (35.82)	1	-	1	-
	Nurse	40 (21.51)	51 (27.42)	95 (51.08)	0.69 (0.19-2.58)	0.585	0.95 (0.18-4.98)	0.952
	Non-clinical staff	47 (18.8)	73 (29.2)	130 (52)	1.7 (0.65-4.42)	0.277	0.59 (0.18-1.94)	0.383
Marital status	Single	54 (26.6)	49 (24.14)	100 (49.26)	1	-	1	-
	Married	54 (18)	97 (32.33)	149 (49.67)	0.77 (0.39-0.35)	0.446	0.27 (1.59-1.31)	0.656
Living with children	No	68 (22.15)	96 (31.27)	143 (46.58)	1	-	1	-
	Yes	40 (20.41)	50 (25.51)	106 (54.08)	2.27 (1.18-4.35)	0.014	2.92 (1.23-6.96)	0.015
Living with the elderly	No	82 (21.47)	119 (31.15)	181 (47.38)	1	-	1	-
	Yes	26 (21.49)	27 (22.31)	68 (56.2)	2.09 (1-4.36)	0.049	1.98 (0.78-5.03)	0.152
Death from COVID-19 in the relatives	No	100 (20.58)	144 (29.63)	242 (49.79)	1	-	1	-
	Yes	8 (47.06)	2 (11.76)	7 (41.18)	0.9 (0.14-5.92)	0.91	3.22 (0.42-24.48)	0.258

continue on the next page

continue of **table 4.** Association Between Socio-Demographic Features, Death from COVID-19, Psychiatric Disorders, and Workplace Features with PTSD among HCWs.

Variable	Category				OR (CI)	P	OR (CI)	P
Death from COVID-19 in the colleagues	No	130 (29.48)	222 (50.34)	89 (20.18)	1	-	1	-
	Yes	16 (25.81)	27 (43.55)	19 (30.65)	1.14 (0.48-2.72)	0.77	2.16 (0.8-5.86)	0.13
Night shift	No	12 (34.29)	20 (57.14)	3 (8.57)	1	-	1	-
	Yes	101 (29.11)	162 (46.69)	84 (24.21)	1.24 (0.5-3.06)	0.638	5.45 (1.15-25.81)	0.033
History of psychiatric disorders	No	132 (37.29)	173 (48.87)	49 (13.84)	1	-	1	-
	Yes	14 (9.4)	76 (51.01)	59 (39.6)	3.13 (1.49-6.56)	0.003	10.62 (4.6-24.49)	<0.001
Workplace hospital	Namazi	39 (27.46)	71 (50)	32 (22.54)	1.33 (0.51-3.44)	0.557	16.72 (2.74-101.9)	0.002
	Faghihi	42 (30)	62 (44.29)	36 (25.71)	1.16 (0.44-3.06)	0.767	13.01 (2.05-82.72)	0.007
	Ali-Asghar	26 (21.67)	61 (50.83)	33 (27.5)	1.26 (0.4-3.95)	0.69	9.13 (1.18-70.56)	0.034
	Dastgheib	18 (36)	27 (54)	5 (10)	1.52 (0.54-4.32)	0.43	2.93 (0.35-24.62)	0.323
	Hafez	21 (41.18)	28 (54.9)	2 (3.92)	1	-	1	-
Workplace ward	Constantly working in COVID-19 wards	26 (22.22)	52 (44.44)	39 (33.33)	3.33 (1.13-9.84)	0.03	2.73 (0.68-10.91)	0.155
	Episodically Working in COVID-19 wards	23 (23.71)	50 (51.55)	24 (24.74)	4.08 (1.72-9.7)	0.001	1.51 (0.52-4.44)	0.45
	Working in non-clinical sectors	62 (28.7)	121 (56.02)	33 (15.28)	4.68 (1.5-14.58)	0.008	0.94 (0.19-4.57)	0.937
	Working in non-COVID-19 wards	35 (47.95)	26 (35.62)	12 (16.44)	1	-	1	-

PTSD: Post-traumatic stress disorder; **CI:** Confidence interval; **OR:** Odds ratio

Discussion

The current study showed that mental health symptoms had a relatively high prevalence among HCWs of Shiraz hospitals during the sixth COVID-19 wave in Iran. Moderate to high levels of anxiety, depression, and insomnia among the participants. Noorbala *et al.* (2015) showed that the prevalence of anxiety and depression in the general Iranian population were 29.5% and 10.39%, respectively [20]. Although previous studies revealed that the outbreak of COVID-19 has also destabilized the general populations mental health, HCWs are at higher risk of presenting mental disorders [19, 20].

Regarding previous studies, Iranian HCWs have expressed their prime sources of concern during the current pandemic as follows: fear of being infected by SARS-CoV-2 or transmitting the disease to their relatives, moral injury caused by being forced to share limited available resources among critically ill patients, lack of protective equipment, and failure to make the necessary arrangements and preparations to face the pandemic by the officials, which can be due to the current economic problems of Iran [21-25].

Regarding Hassannia *et al.* [25] study, anxiety and depression among HCWs were reported at 68.53% and 51.72%, respectively. Also, Azizi *et al.* [26] showed that 43% and 44.8% of Iranian HCWs during the COVID-19 pandemic presented anxiety and depression symptoms, respectively. However, in the current study, the prevalence of anxiety and depression were lower in HCWs.

Accordingly, it seems that over time, from the onset of the pandemic, mental health symptoms could diminish among HCWs. Studies in different countries have reported relatively different prevalence rates in assessing insomnia. While in our study, insomnia prevalence was 24.5%, a systematic review reported the prevalence of insomnia among Chinese HCWs at 38.9% [9].

However, another study in Italy estimated insomnia prevalence among HCWs as only 8.27% [8]. This relatively notable variance can be due to the differences in work shifts, workloads, and rest facilities provided to HCWs in hospitals in different countries.

Also, our study estimated the prevalence of moderate to high PTSD levels at 71%, which is similar to the 71.5% prevalence reported in the study conducted by Lai *et al.* [9].

However, Rossi *et al.* [8] and Lasalvia *et al.* [27] estimated a relatively lower prevalence of PTSD among HCWs (49.38% and 53.8%, respectively). These findings could be due to cultural differences and the level of psychological and social support in different countries.

In our study, based on multiple logistic regression, female gender, positive history of psychiatric disorders, and constant or episodic working in COVID-19 wards over the past 12 months were associated with higher anxiety levels, which are consistent with the results of previous studies [8, 9, 25, 28]. Fear of transmitting the disease to relatives could explain the association of living with the elderly, particularly vulnerable to the disease, with more anxiety symptoms [21, 27]. A fascinating point observed in the current study was the significantly higher level of anxiety in non-clinical sectors staff. This group of employees had even higher anxiety levels than the HCWs who worked episodically in COVID-19 wards.

In contrast to our study, Lasalvia *et al.* indicated that the administrative staff had significantly lower anxiety symptoms [27]. The high prevalence of anxiety among non-clinical staff in our study may be due to their less scientific knowledge about COVID-19 and its transmission routes. Also, in contrast with some other studies that reported younger age as an associated factor with higher anxiety levels, our study found no such association [8, 25].

Regarding our findings, some factors associated with more depressive symptoms included a positive history of psychiatric disorders, working continuously in COVID-19 wards, and working in non-clinical sectors. The association of the depression level with a positive history of psychiatric disorder and working as a front-line HCW was consistent with previous studies [9, 25, 26].

Also, working in non-clinical sectors of hospitals was associated with more symptoms. On the other hand, a higher education level was associated with lower levels of depression. Cohen *et al.*, using cohort data from the

National Longitudinal Survey of Youth from 1979 in the United States, showed the significant effect of higher education levels on reducing the incidence of depression [29]. Unlike other studies, which mainly reported that the female gender, being single, and younger age were associated with more depressive symptoms, no such correlations were observed [2, 8, 9, 25, 26].

Multiple logistic regression showed that HCWs with a history of mental disorders were more likely to suffer from insomnia. However, a higher education level was associated with a lower incidence of insomnia.

Previous studies confirmed that sleep disorders are associated with educational level and past psychiatric disorders [29-31]. However, HCWs who worked at Ali-Asghar, Namazi, Faghihi, and Dastgheib hospitals showed significantly more insomnia.

According to previous research, staff at Ali-Asghar hospital (a front-line COVID-19 hospital) and Namazi and Faghihi hospitals (second-line COVID-19 hospitals) have a higher incidence of insomnia [9]. Also, our findings revealed that the staff of Dastgheib hospital and both front- and second-line hospitals significantly had more insomnia symptoms than Hafez hospital's staff. Although Dastgheib hospital has no COVID-19 ward, it is the largest referral center for patients with thalassemia in southern Iran. In comparison, it has a relatively higher workload than Hafez hospital.

Hence, the higher workload, in addition to direct exposure of HCWs to COVID-19 patients, could effect on insomnia prevalence.

Based on our results, female gender, living with vulnerable groups (children or the elderly), working at night shifts, positive history of psychiatric disorders, constantly or episodically working in COVID-19 wards, working in non-clinical sectors, and working in the front-line (Ali-Asghar) and second-line (Namazi and Faghihi) hospitals were associated with higher levels of PTSD.

In line with previous studies, female gender, positive history of psychiatric disorders, and working in COVID-19 front- and second-line hospitals were associated with PTSD [2, 8, 9, 25, 26, 32]. In addition, since one of the most important concerns of HCWs is transmitting the disease to their relatives, the association between living with vulnerable groups and higher levels of PTSD seems reasonable [22, 33]. Previous studies have also confirmed the role of history of psychiatric disorders as a predictive factor for the risk of PTSD [34, 35]. Also, in contrast with Azizi *et al.* study, working in non-clinical sectors was associated with higher PTSD levels [26].

While Di Tella *et al.* [2] found that older age can significantly increase the risk of PTSD, Rossi *et al.* [8] and Azizi *et al.* [26] reported younger age as an associated factor with higher PTSD levels. However, in the current study, there was no correlation between PTSD and age.

Our findings demonstrated that both HCWs who worked permanently and those who worked episodically in the COVID-19 wards had significantly more mental health symptoms than the non-COVID-19 wards staff. However, the HCWs who worked episodically in the COVID-19 wards suffered from fewer psychiatric disorders.

Regarding current study results, most mental health disorders could have been associated with a prior history of psychiatric disorders, a high workload, and working on the front-line and/or even in non-clinical sectors.

Therefore, by performing periodic mental health assessments for HCWs and identifying at-risk groups, the necessary supportive and preventive measures can be taken at the right time.

Regarding Rouhbakhsh *et al.* study, providing adequate protective equipment, appreciation for the HCWs services, welfare facilities for the staff to stay and rest in the hospitals, training programs to deal with COVID-19 patients, and psychologist counseling for the personnel were reported by HCWs as the important factors [35].

Limitations

As one of the most important limitations of our study, we could not access participants mental health status before and at the beginning of the COVID-19 pandemic. In addition, despite the advantages of face-to-face interviews, there was a limited possibility of selecting a larger sample size due to being time-consuming and costly.

Conclusion

Our study showed that mental disorders among HCWs in Shiraz hospitals was relatively high. Therefore, by conducting periodic mental health assessments, at-risk groups can be identified to be prioritized to receive supportive measures. It is suggested that specific supporting structures should be placed in healthcare systems to prevent psychological complications among HCWs.

Indeed, providing psychological and social support, and appropriate welfare facilities for the HCWs are suggested to ensure that the quality of health care services does not decline.

Conflict of Interest

The authors have declared no conflict of interest. Also, the funding body of the study did not play any role in its design, collection, analysis, data interpretation, and writing the manuscript.

References

1. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497-506.
2. Di Tella M, Romeo A, Benfante A, Castelli L. Mental health of healthcare workers during the COVID-19 pandemic in Italy. J Eval Clin Pract. 2020;26(6):1583-7.
3. Mani A, Fereidooni R, Salehi-Marzijarani M, Ardekani A, Sasannia S, Habibi P, et al. The prevalence and risk factors of death anxiety and fear of COVID-19 in an Iranian community: A cross-sectional study. Health Sci Rep. 2022 Jun 19;5(4):e706.
4. Mowla A, Ardekani A, Feili A, Rahimian Z. Effects of COVID-19 pandemic and lockdown on mental health of Iranian people. Przegl Epidemiol. 2021;75(4):484-489.
5. Pfefferbaum B, North CS. Mental Health and the Covid-19 Pandemic. N Engl J Med. 2020;383(6):510-2.
6. Montemurro N. The emotional impact of COVID-19: From medical staff to common people. Brain Behav Immun. 2020;87:23-4.
7. Farì G, de Sire A, Giorgio V, Rizzo L, Bruni A, Bianchi FP, et al. Impact of COVID-19 on the mental health in a cohort of Italian rehabilitation healthcare workers. J Med Virol. 2022;94(1):110-8.
8. Rossi R, Socci V, Pacitti F, Di Lorenzo G, Di Marco A, Siracusano A, et al. Mental Health Outcomes Among Frontline and Second-Line Health Care Workers During the Coronavirus Disease 2019 (COVID-19) Pandemic in Italy. JAMA Netw Open. 2020;3(5):e2010185.
9. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. JAMA Netw Open. 2020;3(3):e203976.
10. Muller AE, Hafstad EV, Himmels JPW, Smedslund G, Flottorp S, Stensland S, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review. Psychiatry Res. 2020;293:113441.
11. Rossi R, Socci V, Jannini TB, Pacitti F, Siracusano A, Rossi A, et al. Mental Health Outcomes Among Italian Health Care Workers During the COVID-19 Pandemic. JAMA Netw Open. 2021;4(11):e2136143.
12. Doosti-Irani A, Haghdoost AA, Najafi F, Eybpoosh S, Moradi G, Bagheri Amiri F, et al. How Can the Epidemic Curve of COVID-19 in Iran Be Interpreted? J Res Health Sci. 2020;20(3):e00491.
13. Meo SA, Meo AS, Al-Jassir FF, Klonoff DC. Omicron SARS-CoV-2 new variant: global prevalence and biological and clinical characteristics. Eur Rev Med Pharmacol Sci. 2021;25(24):8012-8.
14. Rayani S, Rayani M, Najafi-Sharjabad F. Correlation between anxiety and resilience of healthcare workers during COVID-19 pandemic in the southwest of Iran. Environ Sci Pollut Res Int. 2022; 29(15):21528-21536.
15. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361-70.
16. Kaviani H, Seyfourian H, Sharifi V, Ebra-

himkhani N. Reliability and validity of Anxiety and Depression Hospital Scales (HADS): Iranian patients with anxiety and depression disorders. Tehran Univ Med J. 2009;67(5):379-85.

17. Morin CM. Insomnia: Psychological Assessment and Management. Guilford press: APA PsycNet; 1994.

18. Yazdi Z, Sadeghniiat-Haghighi K, Zohal MA, Elmizadeh K. Validity and reliability of the Iranian version of the insomnia severity index. Malays J Med Sci. 2012;19(4):31-6.

19. Olff M, Bakker A, Frewen P, Aakvaag H, Ajdukovic D, Brewer D, et al. Screening for consequences of trauma - an update on the global collaboration on traumatic stress. Eur J Psychotraumatol. 2020;11(1):1752504.

20. Noorbala AA, Faghihzadeh S, Kamali K, Bagheri Yazdi SA, Hajebi A, Mousavi MT, et al. Mental Health Survey of the Iranian Adult Population in 2015. Arch Iran Med. 2017;20(3):128-34.

21. Saffari M, Raei M, Pourhoseingholi MA, Khosh Fetrat M. Psychological Aspects of COVID-19 in Iran: How the Disease May Affect Mental Health of Medical Staff and General Population? International Journal of Travel Medicine and Global Health (IJT-MGH). 2021;9(2):94-9.

22. Rezapour M, Zarghami M, Sheikhmoonesi F. Psychological Experience and Needs of Front-line Nurses during COVID-19 Outbreak in Iran: A Qualitative Study. J Mazandaran Univ Med Sci. 2021;31(196):125-35.

23. Rouhbakhsh A, Badrfam R, Nejatisafa AA, Soori M, Sharafi SE, Etesam F, et al. Health Care Professionals' Perception of Stress During COVID-19 Pandemic in Iran: A Qualitative Study. Front Psychiatry. 2021;12:804637.

24. Zandifar A, Badrfam R. Fighting COVID-19 in Iran; Economic Challenges Ahead. Arch Iran Med. 2020;23(4):284.

25. Hassannia L, Taghizadeh F, Moosazadeh M, Zarghami M, Taghizadeh H, Dooki AF, et al. Anxiety and Depression in Health Workers and General Population During COVID-19 in IRAN: A Cross-Sectional Study. Neuropsychopharmacol Rep. 2021;41(1):40-9.

26. Azizi M, Kamali M, Moosazadeh M, Aarabi M, Ghasemian R, Hasannezhad Reskati M, et al. Assessing mental health status among Iranian healthcare workers in times of the COVID-19 pandemic: A web-based cross-sectional study. Brain Behav. 2021;11(8):e2304.

27. Lasalvia A, Bonetto C, Porru S, Carta A, Tardivo S, Bovo C, et al. Psychological impact of COVID-19 pandemic on healthcare workers in a highly burdened area of north-east Italy. Epidemiol Psychiatr Sci. 2020;30:e1.

28. Gao YD, Ding M, Dong X, Zhang JJ, Kursat Azkur A, Azkur D, et al. Risk factors for severe and critically ill COVID-19 patients: A review. Allergy. 2021;76(2):428-55.

29. Cohen AK, Nussbaum J, Weintraub MLR, Nichols CR, Yen IH. Association of Adult Depression With Educational Attainment, Aspirations, and Expectations. Preventing chronic disease. 2020;17:E94.

30. Stamatakis KA, Kaplan GA, Roberts RE. Short sleep duration across income, education, and race/ethnic groups: population prevalence and growing disparities during 34 years of follow-up. Ann Epidemiol. 2007;17(12):948-55.

31. Khurshid KA. Comorbid Insomnia and Psychiatric Disorders: An Update. Innov Clin Neurosci. 2018;15(3-4):28-32.

32. Riemann D. Insomnia and comorbid psychiatric disorders. Sleep medicine. 2007;8 Suppl 4:S15-20.

33. Slavish DC, Contractor AA, Dietch JR, Messman B, Lucke HR, Briggs M, et al. Characterizing Patterns of Nurses' Daily Sleep Health: a Latent Profile Analysis. Int J Behav Med. 2022 ;29(5):648-658.

34. Rouhbakhsh A, Arbabi M, Nejatisafa A-A, Sharafi SE, Etesam F, Shahmansouri N, et al. Mental Health of Health Care Workers at Imam Khomeini Hospital in Tehran During COVID-19 Pandemic. Journal of Iranian Medical Council (JIMC). 2021;4(4):209-20.