

# Psychological impact of COVID-19 on health-care workers: A multicenter cross-sectional study

Mohammad Mousavi<sup>1</sup>, Najmeh Ahmadi<sup>2</sup>, Hooria Seyedhosseini Ghaheh<sup>3</sup>, Atefeh Vaezi<sup>1</sup>, Shaghayegh Haghjooy Javanmard<sup>4</sup>

<sup>1</sup>Applied Physiology Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, <sup>2</sup>Student Research Committee, Isfahan University of Medical Sciences, Isfahan, Iran, <sup>3</sup>Department of Pharmaceutical Biotechnology and Pharmaceutical Sciences Research Center, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran, <sup>4</sup>Department of Physiology, Applied Physiology Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

**Background:** Health-care workers (HCWs) as frontline soldiers are involved in the war against COVID-19. Not only their protection from COVID-19 is important but also their mental health is a concern. This study aimed to measure the psychological distress among HCWs in the time of COVID-19 in Isfahan, Iran. **Materials and Methods:** A cross-sectional study was conducted in the 2<sup>nd</sup> month of the spread of COVID-19 in Isfahan, Iran (March 16 to April 3). A total of 321 HCWs participated in an online survey and answered the General Health Questionnaire, the Insomnia Severity Index, and the Medical Outcomes Study Social Support Survey. *t*-test and ANOVA were used for comparing variables between groups. Multiple linear regression was used to evaluate the predictive factors of psychological distress. **Results:** About 34% of our HCWs suffer from some levels of psychological distress. The result of multiple linear regression ( $R^2$ : 0.41) shows that the predictive variables with the highest value were insomnia, working as a medical resident, and lack of social support (standardized coefficient of beta: 0.51, 0.25, and 0.16, respectively;  $P < 0.05$ ). **Conclusion:** The result of our study shows that about one-third of HCWs in COVID-19 special hospitals have some psychological problems. Being a medical resident, suffering from insomnia, and lack of social support are predictive variables.

**Keywords:** COVID-19, health personnel, mental health, public health

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## INTRODUCTION

More than a year have passed since the announcement of the first cases of COVID-19 in China.<sup>[1]</sup> In the era of COVID-19, one of the main responsibilities of public health is to protect health-care workers (HCWs). First from the main disease as HCWs are the frontline of the fight against this pandemic, but afterward, they must be protected from the psychological impacts.<sup>[2]</sup> Working as a frontline HCW in times of health crisis can increase the risk of mental problems in the short and long term.<sup>[3,4]</sup> Previous studies in outbreaks of SARS and MERS revealed that HCWs in comparison to the normal population may suffer more frequently from

psychological symptoms such as insomnia, depression, anxiety, and stigmatization.<sup>[5-7]</sup> Furthermore, it has been reported that HCWs involved in the SARS outbreak experienced significant levels of chronic psychological distress for more than 1 year after the outbreak, showing that the reaction is not merely an adjustment disorder.<sup>[8,9]</sup>

A Chinese study reports higher anxiety scores in HCWs who perform direct care from cases of COVID-19, who are residence of more infected areas, and who are suspected cases themselves.<sup>[10]</sup> Another study reports a higher rate of anxiety in nurses in comparison to doctors.<sup>[11]</sup> General distress, depression, and insomnia are other problems reported in 72%, 50%, and 34% of HCWs, respectively.<sup>[12]</sup> Considering that countries

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**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**Address for correspondence:** Dr. Atefeh Vaezi, Isfahan University of Medical Sciences, Isfahan, Iran. E-mail: a.vaezi@med.mui.ac.ir

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should be prepared for the next wave and potential future outbreaks, focusing on the mental problems of HCWs has become an important concern for governments.<sup>[13]</sup> Although the pandemic of COVID-19 is a global concern, and peoples all over the world may experience the same problems and situations, but local estimations are also important due to affecting factors such as work shifts, ambiguities related to disease, lack of protection equipment, concerns about delivering the disease to family members, and also the level of mental preparedness.<sup>[14,15]</sup> Moreover, different public health measures and the epidemic situation in each area make it necessary to evaluate HCWs' mental health status locally.<sup>[16]</sup> Therefore, we evaluated the psychological impact of COVID-19 on HCWs in Isfahan, Iran.

## MATERIALS AND METHODS

This cross-sectional study was conducted in four tertiary hospitals (Khorshid, Amin, Eisabnmaryam, and Gharazi) in Isfahan, Iran, from March 16 to April 3, 2020. During the study period, these hospitals were actively allocated to COVID-19 patients. Participants include HCWs who are directly/indirectly involved with the care of confirmed or suspected cases of COVID-19.

The sample size was estimated to be 330 and calculated considering the population size of 3000 and expected frequency of 44% for psychological disorder with a power of 80% and type I error of 5%. Using convenience sampling, participants were invited to fill the online questionnaire. The questionnaire consisted of four sections. In the first section, demographic data such as age, sex (female and male), occupancy (physician, resident, medical intern, nurse, and others), type of hospital (teaching and nonteaching), having a risk factor for COVID-19 in themselves or family member (diabetes, hypertension, cardiovascular diseases, respiratory diseases, and immunosuppressive states), and years of occupancy were gathered. In the following sections, the participant answered the General Health Questionnaire-12 (GHQ-12), Medical Outcome Study Social Support Survey (MOS-SSS), and Insomnia Severity Index (ISI).

GHQ-12 is developed by Goldberg and Williams in 1988<sup>[17]</sup> and validated in Persian by Montazeri *et al.*<sup>[18]</sup> for measuring psychological distress. The questionnaire consists of 12 items on a four-point scale (less than usual, no more than usual, rather more than usual, and much more than usual). Each item scores from 0 to 3, the total score would be 0–36, and higher scores indicate worse psychological distress. A score of 16 and more means higher psychological distress.<sup>[19]</sup>

MOS-SSS is developed in 1991 by Sherburne and Stewart to measure the sense of social support<sup>[20]</sup> and validated

in Persian.<sup>[21]</sup> The questionnaire contains 19 items and measures four dimensions: tangible support, emotional and informational support, affectionate support, and positive social interaction. The scoring is on the Likert scale (1: none of the time to 5: all of the time), and the total score is 19–95. The higher the score means a higher sense of social support.

ISI is a 7-item questionnaire used to assess insomnia. This questionnaire was developed by Morin<sup>[22]</sup> and validated in Persian by Yazdi *et al.*<sup>[23]</sup> Each item scores on the Likert scale (0–4), and the total score is between 0 and 28. A higher score suggests more severe insomnia. A score of 8 and more indicates some levels of insomnia.<sup>[12]</sup>

Data were analyzed in SPSS 21.0.1 (SPSS Inc., Chicago, IL, USA). Qualitative and numeric variables were expressed as frequency distribution and mean  $\pm$  standard deviation (SD), respectively. *t*-test and ANOVA were used for comparing variables between groups. Pearson correlation was used to evaluate the correlation between numeric variables. Multiple linear regression model was used to find the predictive factors for psychological distress. The level of significance was considered at 0.05.

This study was approved by the Ethics Committee of Isfahan University of Medical Sciences (IR.MUI.MED.REC.1398.735) and was conducted following the Declaration of Helsinki. Before participation, participants were given information about the aims of this study, voluntary participation, and the ability to withdraw at any time. All data were handled anonymously.

## RESULTS

In this study, 321 HCWs from major tertiary hospitals in Isfahan which were dedicated to COVID-19 patients participated in an online self-administered survey from March 16 to April 3. Supplementary 1<sup>[24]</sup> shows the outbreak situation before and during the study period.

The mean age of participants was 33.5 years (SD: 7.65, range: 23–65). The mean of working experience in our study sample was 6.7 years (SD: 6.20, range: 1–30). In the study sample, 236 (73.8%) participants were female and 156 (48.6%) of them were a nurse.

The mean of GHQ in the whole sample was 13.3 (SD: 6.1, range: 2–36), and 105 (33.4%) participants had psychological distress. The mean score of ISI was 10.3 (SD: 5.95, range: 0–25), and just 123 (38.8%) participants had normal sleep. Considering the sense of social support, the mean score of MOS-SSS in our sample was 68.2 (SD: 16.26, range: 19–95). Table 1 shows

more results based on different demographic variables. Supplementary 2 is presenting the distribution of GHQ-12 and ISI total score.

The Pearson correlation analysis revealed that there is a statistically significant correlation between GHQ-12 and age ( $r: -0.12, P: 0.02$ ), working year ( $r: -0.12, P: 0.03$ ), ISI score ( $r: 0.56, P: 0.000$ ), and social support score ( $r: -0.27, P: 0.000$ ).

To define the predicting factors for psychiatric distress, multiple linear regression was performed ( $R^2: 0.41$ ). The results show that participants who are female, work as a resident, have a lower sense of social support, and have more severe insomnia index were more likely to have psychological problems [Table 2].

## DISCUSSION

In our cross-sectional study, 321 HCWs working in Isfahan hospitals participate in an online survey about psychological distress at the time of the COVID-19 outbreak. About one-third of participants had some levels of psychological problems.

Our study shows that being female, young, working as a medical resident, lower sense of social support, and having insomnia are predictive factors for psychological distress.

In a meta-analysis, the prevalence of stress, anxiety, and depression in the general population in the time of COVID-19 was reported to be 29.6%, 31.9%, and

33.7%, respectively.<sup>[25]</sup> In a study on the Iranian general population using the State-Trait Anxiety Inventory, 68% of responders had moderate-to-severe anxiety.<sup>[26]</sup> About 40% of the Chinese youth population have some levels of psychological problems some weeks after the occurrence of COVID-19.<sup>[27]</sup> From Chinese HCWs, 44% reported symptoms of anxiety.<sup>[12]</sup> In Singapore, 11% of HCWs reported anxiety and 6% reported stress symptoms.<sup>[28]</sup> In our study, we found psychological distress in 34% of HCWs, which is much lower than the frequency of stress symptoms in Iranian general population; this difference could be due to higher health literacy of HCWs.<sup>[29]</sup> The frequency of psychological distress in our study is almost lower than the prevalence of anxiety symptoms in Chinese HCWs, but much higher than the reported prevalence in Singapore. Different factors may be a contributor to the prevalence of mental health problems, such as the behavior of the epidemic and the time of the survey in different countries.<sup>[30]</sup>

One of the predicting factors for psychological distress in our study was being female and younger age, although not as strong as a sense of social support, insomnia, and working as a medical resident. This finding was in line with previous studies which reported that women are at higher risk for incidence of psychological symptoms in the general population<sup>[31,32]</sup> and also in HCWs.<sup>[33]</sup> Moreover, previous studies showed that work conditions may affect women differently, for example, family-related roles of women prevail as another source of stressors.<sup>[34]</sup> Although older adults are more susceptible to COVID-19,<sup>[35]</sup> studies

**Table 1: Demographic characteristics by General Health Questionnaire-12, Insomnia Severity Index, and Medical Outcomes Study Social Support Survey**

|  | Frequency, n (%) | ISI, mean±SD | P     | MOS-SSS, mean±SD | P    | GHQ-12, mean±SD | P     |
|--|------------------|--------------|-------|------------------|------|-----------------|-------|
| Gender   |                  |              |       |                  |      |                 |       |
| Female   | 236 (73.8)       | 10.6±5.84    | 0.23  | 68.0±15.87       | 0.7  | 13.8±6.14       | 0.02  |
| Male   | 84 (26.3)        | 9.7±6.25     |       | 68.6±17.34       |      | 12.0±5.87       |       |
| Occupancy  |                  |              |       |                  |      |                 |       |
| Physician  | 25 (7.8)         | 8.7±5.99     | 0.07  | 69.7±17.40       | 0.76 | 13.4±5.85       | 0.000 |
| Resident   | 51 (15.9)        | 10.5±6.56    |       | 69.9±15.19       |      | 16.5±6.60       |       |
| Medical intern   | 45 (14.0)        | 11.9±6.70    |       | 68.9±13.19       |      | 13.7±7.02       |       |
| Nurse  | 156 (48.6)       | 10.6±6.65    |       | 67.0±17.07       |      | 12.9±5.55       |       |
| Other HCWs   | 44 (13.7)        | 8.7±5.10     |       | 69.1±17.18       |      | 10.5±4.93       |       |
| Type of hospital   |                  |              |       |                  |      |                 |       |
| Teaching   | 278 (88.3)       | 10.6±5.96    | 0.04  | 68.3±16.17       | 0.54 | 13.4±6.17       | 0.49  |
| Nonteaching  | 37 (11.7)        | 8.5±5.32     |       | 66.5±17.57       |      | 12.6±5.58       |       |
| Past medical history of COVID-19 risk factors in participant |                  |              |       |                  |      |                 |       |
| Yes  | 14 (4.4)         | 9.5±6.52     | 0.59  | 73.2±17.27       | 0.24 | 10.4±5.51       | 0.08  |
| No   | 307 (95.6)       | 10.4±5.93    |       | 68.05±16.21      |      | 13.4±6.10       |       |
| Family history of COVID-19 risk factors in participant       |                  |              |       |                  |      |                 |       |
| Yes  | 171 (53.3)       | 10.9±5.86    | 0.057 | 67.4±16.69       | 0.35 | 13.6±6.09       | 0.33  |
| No   | 150 (46.7)       | 9.7±6.00     |       | 69.1±15.76       |      | ±6.11           |       |

ISI=Insomnia Severity Index; MOS-SSS=Medical Outcomes Study Social Support Scale; GHQ-12=General Health Questionnaire-12; HCW=Health-care worker; SD=Standard deviation

**Table 2: Risk factors for psychological distress identified by multiple linear regression analysis**

|                      | Unstandardized coefficient |      | Standardized coefficient<br>$\beta$ | Significance | 95% CI for B |             |
|----------------------|----------------------------|------|-------------------------------------|--------------|--------------|-------------|
|                      | B                          | SE   |                                     |              | Lower bound  | Upper bound |
| Constant             | 12.87                      | 2.07 |                                     | 0.000        | 8.78         | 16.96       |
| Social support       | -0.06                      | 0.01 | -0.16                               | 0.000        | -0.09        | -0.02       |
| Insomnia index       | 0.51                       | 0.04 | 0.51                                | 0.000        | 0.42         | 0.60        |
| Occupancy            | 4.15                       | 0.74 | 0.25                                | 0.000        | 2.69         | 5.61        |
| Age                  | -0.04                      | 0.03 | -0.05                               | 0.228        | -0.11        | 0.02        |
| Gender               | 1.23                       | 0.61 | 0.09                                | 0.046        | 0.02         | 2.45        |
| Past medical history | -1.40                      | 1.38 | -0.04                               | 0.310        | -4.13        | 1.31        |
| Type of hospital     | -0.83                      | 0.85 | -0.04                               | 0.329        | -2.52        | 0.85        |

SE=Standard Error; CI=Confidence Interval

show that youngsters are more susceptible to psychological distress which may be due to weaker resilience factors and lower resources in face of crisis.<sup>[36,37]</sup>

Another aspect of mental health is sleep quality. In this study, we found that only about 38% of our study population have no problem with sleep and others suffer from different levels of insomnia. Besides, we found that working in teaching hospitals is associated with insomnia but not with psychological impact. On the other hand, working as a resident (considering that residents are working in teaching hospitals) is a predictive factor for psychological problems but not for insomnia. This is in contrast to a recent study, which reports that nurses in comparison to physicians are more prone to mental symptoms<sup>[38]</sup> which may be due to different working conditions.

Loneliness and Isolation is another factor that predisposes HCWs to stress and anxiety. Our findings in line with previous studies show that lack of social support is related to mental health problems.<sup>[39,40]</sup> Lack of social support in the time of COVID-19 may be more prominent for HCWs as they have to keep the distance from their family members who are a principal source of support and they also face the loss of co-workers which is also another stressor itself.<sup>[41,42]</sup> Although one reason for anxiety and stress is reported to be family concerns,<sup>[43]</sup> the result of our study shows that this is not related to the level of risk of the family members. The lacks of enough knowledge about COVID-19 treatment and uncertainty around its progression as well as the shortage of resources have encountered HCWs with difficult situations and sometimes moral dilemmas during the pandemic.<sup>[44]</sup>

Other important issues in worker stress are leadership styles and patterns of management communication. Hence, organizational psychological support should be mentioned. Prior pandemics have demonstrated that the context of an organization has a potent effect on psychological outcomes for the employees.<sup>[45]</sup> In pandemics, clear protocols and preventive measures reduce the likelihood of emotional distress, as does peer support.<sup>[46]</sup> Shanafelt *et al.* in their recent study on the anxiety of HCWs has found five

main requests of HCWs from their employer during the COVID-19 pandemic: hear me, protect me, prepare me, support me, and care for me.<sup>[47]</sup> Hence, psychological support of health care workers will protect them to perform their best over an extended period of Covid-19 pandemic and any other health crisis.

## CONCLUSION

Altogether, HCWs need support, physically and mentally. They need a psychologically safe environment, robust leadership, organizational plans for staff well-being, consistent communication, and team support. Taking care of those who take care of the community is not only inevitable but also a moral duty of the health system. The result of our study has proved that designing early supportive psychological interventions to improve the mental health of HCWs is important.

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## Conflicts of interest

There are no conflicts of interest.

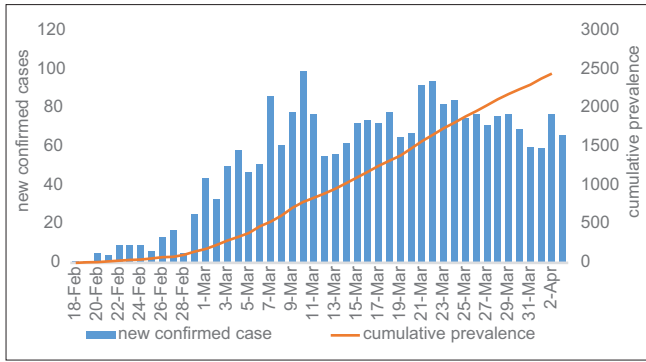
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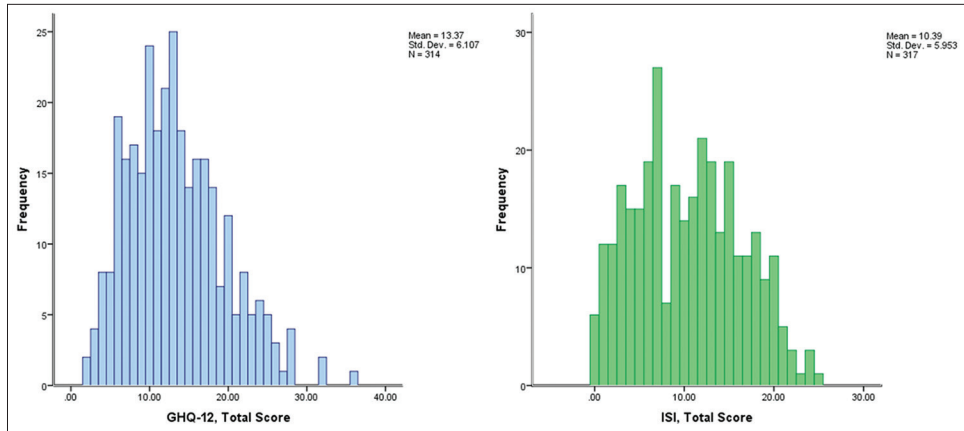


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**Supplementary 1:** New and cumulative confirmed cases of COVID-19 in Isfahan, Iran. \*Data were extracted from Isfahan COVID-19 Registry (I-CORE) (1)



**Supplementary 2:** Distribution of General Health Questionnaire-12 and Insomnia Severity Index score