Original Article

Evaluating the General Health Risk Factors (Physical, Psychological, and Social Functions) of Hospital Staff a Year after COVID-19 Outbreak in 2020-2021, Isfahan Iran

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Abstract

Background: Healthcare workers are the first to be exposed to the virus and are at greater risk than the general public. This study aimed to examine the risk factors that affected hospital staff's general health during the COVID-19 pandemic in Isfahan, Iran. **Materials and Methods:** This cross-sectional study was conducted on the staff of all hospitals in Isfahan one year after the COVID-19 outbreak (2021–2022). The General Health Questionnaire (GHQ) was used to determine social functioning, while the Patient Health Questionnaire (PHQ) was employed to assess physical and psychological health status. **Results:** There was a significant positive relationship between work experience in the COVID-19 ward and the scores of physical health ($r = 0.26$, df = 298, $p < 0.01$), depressive symptoms ($r = 0.24$, df = 298, $p < 0.01$), and anxiety ($r = 0.17$, df = 298, $p < 0.01$). The job and income satisfaction score was negatively related to the scores of social function variables ($r = -0.25$, df = 298, $p < 0.01$) and depressive syndrome ($r = -0.12$, df = 298, $p < 0.05$). The fear of COVID-19 was related to social functioning ($r = 0.12$, df = 298, $p < 0.01$), physical health ($r = 0.31$, df = 298, $p < 0.001$), depressive symptoms ($r = 0.36$, df = 298, $p < 0.001$), panic attacks ($r = 0.15$, df = 298, $p < 0.01$), and generalized anxiety ($r = 0.23$, df = 298, $p < 0.001$). Gender and age significantly predicted general health. **Conclusions:** The COVID-19 pandemic negatively affected all dimensions of hospital staff's health, particularly those with underlying physical conditions.

Keywords: *COVID-19, general health, Isfahan hospital staff, risk factors*

Introduction

High contagiousness and rapid spread, coupled with epidemics, a high mortality rate, and predictions that at least 60% of the population would be infected, raised public health concerns and placed tremendous pressure on communities.[1,2] Healthcare workers were the first to be exposed to the virus and were at greater risk than the general public.[3] The increasing number of confirmed and suspected cases, constant contact with COVID-19 patients in hospitals, countless deaths, extreme fatigue, sudden stress due to overwork and long shifts, insomnia, and frustration from being unable to provide optimal patient care all negatively affected the mental health of healthcare workers.

At the peak of the disease, it is likely that symptoms such as anger, rage, fear, and anxiety were at their highest level, burdening society far more and for a longer duration than the infection itself.[4]

Lai *et al*.[5] found that 14% of physicians and approximately 16% of nurses exhibited symptoms of moderate to severe depression. Maunder *et al*.[6] demonstrated that caring for sick colleagues during an epidemic might increase the anxiety of hospital staff and render them more psychologically vulnerable.

Mental health problems cause dysfunction, lack of motivation, anxiety, fear, and worry, leading individuals to spend a significant portion of their mental energy on these issues. Therefore, planning and investment in mental health support that maintains and improves employees' health can ultimately increase efficiency and return on investment.[7] This study aimed to examine the possible risk factors related to the general health (physical, psychological, and social functioning) of the staff of all hospitals in Isfahan one year after the COVID-19 outbreak. The findings of this

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study may help manage hospital staff's health in similar conditions in the future.

Materials and Methods

This descriptive-analytical cross-sectional study was conducted on the staff of all hospitals in Isfahan, Iran (26 private and educational hospitals), one year after the COVID-19 outbreak (from April 2021 to November 2021).

The study population included the staff of all hospitals in Isfahan, both private and public-educational. A total of 350 staff members were selected using the formula used to determine the sample size in epidemiological studies. Bartlett's test of sphericity and the Kaiser–Meyer–Oklin (KMO) measure of sampling adequacy were used to determine the suitability of the sample size for factor analysis. The KMO test results confirmed the suitability of the sample size, and Bartlett's test indicated a single matrix of variable correlation coefficients within the community. Stratified quota sampling was used to select the participants. Initially, the proportion of each hospital's staff in the sample was determined based on the number of staff members in each hospital. Then, staff with different job roles were randomly selected. In other words, the proportion of each job category in that hospital was determined by the percentage of staff in each job category. Afterward, the staff from each job category was randomly selected.

Participants were classified into three subgroups based on their job categories: staff who had direct contact with COVID-19 patients (including nurses, paramedics, radiology technicians, laboratory samplers, etc.), staff who were indirectly involved with patients (including guards, service personnel, warehouse workers, laundry staff, etc.), and administrative staff. The participants' ages ranged from 25 to 60; all had worked in one of the hospitals in Isfahan for at least 1 year during the COVID-19 pandemic and had consented to participate in the research. It is noteworthy that more than 20% of the questionnaires were excluded from the analysis due to incomplete responses.

The data were collected using the following instruments:

1-Demographic profile checklist: This checklist inquired about age, gender, marital status, number of children, history of COVID-19 infection in the staff or their family, deaths of others due to COVID-19, history of physical and psychological diseases, and the history of taking psychiatric drugs and receiving psychological therapies.

2-Researcher-made questionnaire on general health risk factors for hospital staff during the COVID-19 epidemic: This questionnaire included 20 items that assess potential risk factors affecting the general health of the staff in three areas: work experience in the COVID-19 ward, fear of the effects of the disease on their economic and health status and that of their family, and job and income satisfaction. Exploratory factor analysis (EFA) with Varimax rotation was used to examine the validity of the questionnaire. The results revealed its appropriate psychometric properties and acceptable reliability and validity. The construct validity of this questionnaire indicated a three-factor structure. Its internal consistency was estimated by Cronbach's alpha coefficients for the total score and its three subscales, which were 0.78, 0.68, 0.63, and 0.71, respectively. The subscale of work experience in the COVID-19 ward included items 1, 2, 3, 7, 8, 15, 17, and 18. The subscale for fear of the disease affected their economic and health status, and family comprised items 9, 10, 11, 12, 19, and 20. The job and income satisfaction subscale included items 4, 5, 6, 13, 14, and 16.

3-A Patient health questionnaire (PHQ) was used to assess the staff's physical and mental health status. The PHQ, developed by Spitzer *et al*., consists of 11 sections.[8] This study used items 1, 2, 3, 4, 5, and 11 to determine general physical and psychological health (anxiety and depression). A higher score on the questionnaire indicates a lower general health status, and vice versa.[9] Ebrahimi *et al*.[10] estimated the internal consistency of this questionnaire in 2018 in Isfahan to be 0.92, with a test-retest reliability of 0.70. Factor analysis demonstrated a suitable two-factor structure for patients. The correlation coefficients of these two factors with the PHQ physical symptoms scale were 0.51 and 0.59, respectively. The construct and convergent validities were also appropriate. In Zhang's study, the PHQ showed high diagnostic accuracy, with a sensitivity of 52.5%, specificity of 61.9%, and accuracy of 57.9% at the cut-off point of 9.[11,12]

4-General health questionnaire (GHQ): The questionnaire comprises 28 items across four subscales: physical symptoms, anxiety and sleep disorders, social dysfunction, and depressive symptoms. In this study, items 15–21 of the GHQ were used to determine the social functioning of the staff. A total score of 0 to 6 indicates no problem, scores between 7 and 11 indicate mild problems with social functioning, 12 to 16 specify moderate problems, and scores between 17 and 21 denote severe problems. The Goldberg 28-item questionnaire has acceptable validity and reliability. The validity indexes of the questionnaire, assessed by test-retest, split-half, and Cronbach's alpha were 0.70, 0.93, and 0.90, respectively. Based on the results of this study, the 28-item form of the GHQ is suitable for psychological research and clinical activities.[13]

Data were analyzed using SPSS (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Mean and standard deviation were used to describe quantitative data, while frequency and percentage were used for qualitative data. The Pearson Chi-square test was used to examine the relationships among variables, including general health status (a general factor derived from the sum of physical

health, mental health, and social function scores), risk factors, gender, education, and age. One-way ANOVA was used to examine difference between three groups: administrative staff, staff with direct contact with COVID-19 patients, and staff with indirect contact with these patients. Hierarchical regression analysis was used to control for the effects of gender, age, and education when predicting general health based on risk factors (work experience in the COVID-19 ward, income satisfaction, and fear of the disease's impact on their economic and health status and that of their family).

Ethical considerations

The research ethics committee of Isfahan University of Medical Sciences approved this study (IR.MUI.MED.REC.1399.1166). Before selecting the sample, the researcher explained the purpose of the study, its procedures, and the research method to the participants. Only staff who consented to participate were included in the study. Participants were informed that all the questionnaires were anonymous and that their information would be used only for research purposes.

Results

The present study was a descriptive-analytical cross-sectional study conducted from 2020 to 2022 in 26 public, educational, and private hospitals in Isfahan. The sample included 307 staff members, including 131 men, with a mean age of 38.48. Of the participants, 229 were married, and 75 were single. Furthermore, the staff members were categorized into three groups based on their job and contact with COVID-19 patients: direct contact (213 staff), indirect contact (71 staff), and administrative staff (23 staff).

The relationships among the variables, including, general health status (a general factor obtained from physical health, mental health, and social function scores), risk factors, gender, education, and age, are shown in Table 1.

Descriptive findings (mean and standard deviation) of work experience in the COVID-19 ward, fear of COVID-19 effects, and general health variables (depression, generalized anxiety disorder, panic attacks, physical health, and social functioning) are reported in Table 2.

Pearson correlation was used to examine the relationships among these variables, with results shown in the correlation matrix [Table 3].

As mentioned, hospital staff were classified into three groups based on their work type and contact with COVID-19 patients. Table 4 presents the mean general health scores for each group based on their hospital job.

One-way ANOVA was used to test the hypothesis that staff with more direct contact with COVID-19 patients were more affected. The results revealed a significant difference between the general health scores of the groups ($F_{(2,304)} = 8.25$, $p < 0.001$). Post-hoc Tukey's test was employed to evaluate pairwise differences. The results indicated a significant difference between the group with direct contact with COVID-19 patients and those with indirect contact ($F_{(2,304)} = 8.25$, $p = 0.002$). Lower scores on all general health questionnaires indicate higher general health status. Staff with direct contact with COVID-19 patients reported lower general health status than those with indirect contact with COVID-19 patients and administrative staff. Staff with indirect contact with COVID-19 patients also reported lower general health status than the administrative staff ($F_{(2,304)} = 8.25$, $p = 0.023$).

Hierarchical regression analysis was used to control for the effect of gender, age, and education when predicting general health based on risk factors (work experience in the COVID-19 ward, job and income satisfaction, and fear of the disease effects). The results are presented in Table 5.

As shown in Table 5, gender and age significantly affected general health. In the first step of the analysis, gender, age, and education were entered. In the second step, these variables were controlled. After controlling for the effects of gender, age, and education, the results showed that work experience in the COVID-19 ward, job and income satisfaction, and fear of the disease effects (as risk factors) significantly predicted 20% of the variance in general health.

There was no significant difference between married and single staff members in their general health and marital status. However, the occupation of the spouse could affect the general health of married staff. Spouses were classified into six job categories: housewife or unemployed,

Table 1: Descriptive Statistics and Correlations of the Study Variable

Variable	Number	Mean (Standard deviation)	1	2	3	4	5	6
1. Gender	299	N (%)	1					
2. Education	299	N (%)	0.29**	1				
3. Age	299	38.44 (9.36)	0.01	-0.16**	1			
4. General Health	299	49.51 (15.32)	0.24***	0.05	0.15**	1		
5. Work experience in COVID-19 ward	299	16.58 (6.38)	0.09	0.13**	−0.01	0.25***	1	
6. Job and income satisfaction	299	6.28 (3.12)	0.11*	-0.16**	0.17**	−0.16**	0.07	1
7. Fear of COVID-19 effects	299	15.03 (4.38)	0.18**	0.11	−0.04	0.32	-0.04	0.35***

*p<0.05. **p<0.01. ***p<0.001

employee, medical staff, self-employed, worker, and engineer. A significant difference was found between staff whose spouses were housewives and those whose spouses were self-employed. Given that low general health scores mean higher general health status, staff with spouses who were housewives reported higher general health status compared to those with self-employed spouses. However, there was no significant difference among other groups.

Another factor was the presence or history of underlying physical diseases. The results showed that staff with underlying diseases had a lower general health status compared to those without such conditions. Therefore, underlying diseases during the COVID-19 pandemic caused general health problems.

Table 2: Mean and Standard deviation of the studied variables

Variables	Number	Mean	Standard Deviation
Work experience in COVID-19 ward	324	16.42	6.42
Job and income satisfaction	324	6.38	3.16
Fear of COVID effects	324	15.02	4.76
Social functions	319	8.16	2.94
Physical health	323	9.11	5.17
Depression symptoms	320	9.11	5.31
Panic attacks	314	17.28	3.92
Generalized anxiety disorder	311	5.34	3.45

Discussion

The factors assumed to affect the general health of medical staff included work experience in the COVID-19 ward, fear of the effects of this disease on their economic and health status and that of their family, and job and income

Table 3: Matrix of correlations coefficients among studied variables

	1	2	3	4	5	6	7	8
1. Work experience in Covid-19 ward	1							
2. Job and income satisfaction	0.02	1						
3. Fear of Covid-19 effects	0.36**	−0.03	1					
4. Social functions	0.05	−0.25**	0.12*	1				
5. Physical health score	0.26**	0.02	0.3**	0.2**	1			
6. Depressive symptoms score	0.24**	−0.12*	0.35**	0.39**	0.62**	1		
7. Panic attacks	0.15**	−0.05	0.14**	0.04	0.35**	0.37**	1	
8. Anxiety symptoms score	0.17**	−0.08	0.23**	0.34**	0.62**	0.64**	0.35**	1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed)

Table 4: Mean and standard deviation of the general health of different hospital jobs

Job Status	Number	Mean	Standard Deviation	Standard Error
Direct contact with Covid-19 patients	213	51.69	15.89	1.09
Indirect contact with Covid-19 patients	71	44.60	12.56	1.49
Administrative	23	42.96	12.92	2.69
Total	307	49.4	15.33	0.87

Table 5: Hierarchical Regression Results for demographic variables

Effect	B	95% Confidence Interval for B		Standard Error	B	R^2	$\triangle R^2$
		Lower Limit	Upper Limit				
Step 1						0.08	0.07***
Constant	28.25***	16.46	40.04	5.991			
Age	7.36***	3.76	10.96	1.828	0.23***		
Gender	0.242**	0.059	0.424	0.093	0.15**		
Education	0.040	−1.71	1.79	0.889	0.01		
Step 2						0.20	0.19***
Constant	6.09**	9.52	2.66	6.22			
Age	0.19***	0.36	0.015	1.74	0.19***		
Gender	0.36*	2.02	−1.30	0.09	0.11*		
Education	0.42	0.69	0.155	0.84	0.02		
Work experience in COVID-ward	-0.86**	-0.34	−1.38	0.14	0.18**		
Job and income satisfaction	0.67***	1.03	0.312	0.26	-0.17***		
Fear of COVID-19 effects	6.09***	9.55	2.66	0.18	0.21***		

*p<0.05. **p<0.01. ***p<0.001

satisfaction. Staff were categorized into three groups based on their contact with patients: those with direct contact, those with indirect contact, and administrative staff. The results indicated that staff with more direct contact with patients or greater work experience in the COVID-19 wards had lower general health status.

These findings were consistent with a systematic review that examined the effects of pandemic diseases on the mental health of medical staff.[14] Both this study and another study showed that nurses faced a higher risk of psychological disorders due to increased contact with COVID-19 patients.[14,15] Conversely, our study showed that staff with indirect contact with patients had poorer general health than administrative staff.[16]

Regarding fear of the effects of this disease on their economic and health status and that of their family, our study demonstrated that greater fear was associated with lower general health. Gaëtan Mertens also studied the prognostic factors of fear related to COVID-19 disease. They found that individual differences, concerns about the health of loved ones, and media and news significantly increased fear among healthcare workers, and greater fear correlated with lower general health.[17] This finding is consistent with the results of our study.

Meanwhile, an increase in job and income satisfaction was associated with improved general health among the staff. Conversely, the study results showed that job and income satisfaction tended to increase with age. However, as an independent factor, age had a significant negative relationship with the general health level of medical staff. In other words, older staff members reported lower levels of general health.[18] The findings of our study are consistent with this observation. Zhang J *et al*.[19] also showed that age was positively associated with higher levels of job satisfaction. Purba *et al*.[20] also reported that older staff were more likely to experience depression and anxiety disorders due to increased fatigue from high workloads.

Valaine's study also showed that marital status alone was not a determining factor in mental health during the pandemic; rather, the level of marital satisfaction had a significant impact on their mental health status.[21] In contrast, Rashid and Alonso reported different results, showing that married medical staff were less likely to develop psychological diseases.[22,23]

One of our research hypotheses was that underlying physical diseases negatively influence general health. The results confirmed this hypothesis, indicating that the general health of staff with underlying physical conditions or a history of such diseases were more likely to be affected by the pandemic. Chew also found that medical staff with underlying physical diseases were more likely to experience psychological trauma during the COVID-19 period.[24] Additionally, there was a significant positive relationship between the level of psychological trauma and occurrence of new physical symptoms.

Some hospitals in the city did not permit data collection due to quarantine conditions and concerns for the health of researchers and patients. Furthermore, some staff, especially nurses, refused to participate due to high workloads and the extensive number of questionnaire items. Certain questionnaires were also excluded from the analysis due to incomplete responses.

Conclusion

The COVID-19 pandemic affected not only physical health but also various dimensions of hospital staff's overall health. The negative effects were most pronounced among older staff, those with direct patient contact, and individuals with underlying physical diseases. Pandemic worries and fears regarding their own health and that of their families caused lower general health levels among the staff. However, higher levels of job and income satisfaction were found to be protective factors.

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Conflicts of interest

Nothing to declare.

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