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Psychological adverse effects of COVID-19 pandemic on health service providers: an online survey

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Abstract

Background: In the current situation of the COVID-19 pandemic, health service providers (HCPs) suffered from mental health consequences such as depression, anxiety, fear, and post-traumatic stress disorder (PTSD). The study aimed to evaluate the adverse psychological impacts of the COVID-19 pandemic on HSPs at the Tabriz University of Medical Science, North West of Iran. An online survey was conducted to assess the psychological adverse effects of COVID-19 during the pandemic of COVID-19 from May 2021 to February 2022. Psychological adverse effects including depression, anxiety, PTSD, and fear were measured using valid instruments. Overall, 298 HSPs responded to the questionnaires. Descriptive and multiple logistic regression analyses with crude and adjusted ORs were used to estimate mental health adverse effects.

Results: The overall prevalence of depressive symptoms, major depression disorder (MDD), anxiety, and probable PTSD were 58%, 9.1%, 61.7%, and 15%, respectively. The fear of COVID-19 scale (mean) was 17.6 ± 6.2 . We found mental health adverse effects were higher in HSPs who worked in the treatment and health sections than HSPs in the support section. Having a history of mental disorder, HSP type (health and treatment), and female sex had a statistically significant association with MDD and depressive symptoms.

Conclusions: Mental health problems were high in HSPs. The study highlights the demand for support systems and appropriate interventions for improving HSPs' mental health and well-being during the COVID-19 pandemic.

Keywords: Health service provider, COVID-19, Depression, Anxiety, Iran

Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), commonly named coronavirus disease 2019 (COVID-19) [1, 2], has strongly affected the performance of healthcare systems around the world [3]. It is clear that during this challenging time, people may be feeling fear, depression, anxiety, and worry due to COVID-19

morbidity and mortality and the continuous shifting alerts of the virus [4].

During the COVID-19 pandemic, health service providers (HCPs) suffered from huge mental health distress in healthcare settings [5]. Given that HSPs are providing direct care for COVID-19 patients, they are more possible to be infected than other groups of people [6]. This makes them fear the virus transmission, worry for family health, personal isolation, trust in and support from their institute, and stigma [7–9].

Consequently, HSPs will be under overwhelming mental health concerns which may suspect various psychological consequences, such as fear, depression, anxiety,

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and stress. Evidence indicated that pooled prevalence for anxiety varied from 45% to 69% and depression from 38% to 60%, and acute stress disorder was 31% to 82% [10].

In a study conducted in Ethiopia during the COVID-19 pandemic, the prevalence of depression, anxiety, and stress were 58.2%, 64.7%, and 63.7%, respectively [8]. Likewise, in China, 53.8% of the participants suffered from psychological problems, 16.5% depressive symptoms, 28.8% anxiety symptoms, and 8.1% reported stress [11]. Similarly, in the study conducted among nurses in Taiwan, 11% of them suffered anxiety, depression, and somatization during the pandemic [12].

Several studies have been performed on the mental health of HSPs during the COVID-19 pandemic in various countries [13–16]. However, there is poor evidence in East Azerbaijan Province, especially regarding depression, anxiety, post-traumatic stress disorder (PTSD), and fear of the virus. The results of this study can provide imperative information to support healthcare managers and the provision of mental health services for HSPs. Furthermore, a better understanding of the mental health impacts of COVID-19 on HSPs is significant to identify appropriate interventions.

Methods

Study design and sampling

An online cross-sectional survey was performed to assess the psychological consequence and worries of COVID-19 pandemic in health service providers (HSPs) at Tabriz University of Medical Sciences during the pandemic from May 2021 to February 2022. The target population was all employed HSPs at Tabriz University of Medical Sciences. The study samples were included through stratified random sampling and proportional to the size of the University's three Vice Chancellors and the size of health service centers. At first, we categorized all HSPs into three strata including "health and education," "treatment," and "supportive," and then samples were assigned based on the size (number of HSPs) of each stratum. Within the stratum, samples were considered for each unit in proportion to the size of that stratum. Health and Education providers who worked under health Vice Chancellors provided first-line healthcare services through primary health care (PHC) in Iran. Apart from screening centers, they are less in direct contact with COVID-19 patients. They are often known as community health workers in Iran [6]. HSPs who worked under treatment Vice Chancellors include physicians and non-physicians in hospitals, and most of those are in direct contact with COVID-19 patients. HSPs who worked under support Vice Chancellors included non-medical providers who present support services for other cadres including manpower

supply, resource management, finance, recruitment, and cleaning and physical services.

The sample size was determined by considering a confidence level of 95%, $\alpha=0.05$, $P=0.4$, $d=0.1p$, and 10% compensation due to non-respondents; the total sample size was 300 subjects.

Eligibility

Inclusion criteria considered employed HSPs at the Tabriz University of Medical Sciences with at least 1 year experience and included any type of employment such as formal, contractual, or temporary. Exclusion criteria have also considered non-informed consents.

Data collection

To prevent the spread of COVID-19 infection and easy access, an online (platform) survey was conducted for assessing the psychological outcomes and implications of the COVID-19 pandemic on HSPs. The online link of the questionnaire was sent to the participants through the university website that was accessible to all HSPs, electronic networks (WhatsApp), official letters, and/or emails.

Measures

We assessed COVID-19-related health concerns and mental health consequences including depression, anxiety, post-traumatic stress disorder (PTSD), and phobia. In addition to the assessment of the psychological adverse effects of COVID-19 on HSPs, we also asked about their history of depressive disorders and antipsychotic use and referred them to a psychiatrist before and/or during the COVID-19 pandemic through self-reporting. In this way, we are able to compare a load of referrals to receive psychiatric services in the pre- and post-COVID-19 pandemic period among HSPs.

Patient Health Questionnaire (PHQ-9) Depression Scale [17] was used to assess both major depression and sub-threshold depressive disorder in the HSPs [18]. The PHQ-9 measures depressive symptoms and severity over the past 2 weeks, and the scoring system is based on a 4-point scale: 0 (*not at all*), 1 (*several days*), 2 (*more than half the days*), and 3 (*nearly every day*) based on previous study [19]. The total scores of the tool ranged between 0 and 27. MDD is suggested if of the 9 items, "5 or more are checked as at least 'more than half the days'" and/or "either item 1 or 2 is checked as at least 'more than half the days.'" Threshold depressive symptom is suggested if "Of the 9 items, between 2 to 4 are checked as at least 'more than half the days'" and/or "either item 1 or 2 is checked as at least 'more than half the days.'" The psychometric properties of the Persian version of PHQ9

were confirmed in various groups of populations in Iran [20–22].

General Anxiety Disorder-7 item (GAD-7) scale used to evaluate the general anxiety symptoms in HSPs. The tool involves 7 items that assess GAD symptoms and their severity. Respondents rated their level of agreement with the statements using a 4-point scale: 0: not at all, 1: several days, 2: more than half of the days, and 3: nearly every day. The score range is between 0 to 21; the higher GAD-7 score indicates greater symptom severity [23]. The reliability and validity of the Persian version of GAD-7 were confirmed in previous studies in Iran among several target groups [24, 25]. The Cronbach's alpha for the Persian version of the GAD-7 scale was 0.88 [26]. GAD-7 is the frequently used screening measure for generalized anxiety symptoms in different patient groups [27].

Fear of COVID-19 scale (FCV-19S), Persian version [28, 29], is a 7-item scale that measures the fear of COVID-19. Each item on the scale is responded to using a 5-point, Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). A total score could be calculated by summing up each item score (ranging from 7 to 35).

The primary care post-traumatic stress disorder for DSM-5 (PC-PTSD-5) scale [30] was used to evaluate respondents with low and probable PTSD over the past month. This tool involved a 5-item and begins with an item designed to measure whether the HSP has had any experience with traumatic events. If a HSP rejects all exposure, the PTSD-5 is complete with a score of 0. However, if a HSP indicates that she/he has experienced a traumatic event over the course of their life, the respondent is instructed to respond to five additional *yes/no questions* about how that trauma exposure has affected them. Probable PTSD is suggested if: of the 5 items, 4 or more items were positive (yes), and low probable is suggested if of the 5 items, 3 items were positive (yes) [31].

Statistical analysis

The SPSS software (version 19.0, Chicago, IL, USA) was carried out for data analysis, Kolmogorov-Smirnov test to check data normality, chi-square (χ^2) test to assess the relationship between dichotomous and nonparametric variables, independent *t*-test and Mann-Whitney for comparing parametric variables between two groups of with psychological disorders and without. Multiple logistic regressions [32] were used to estimate the adjusted odds ratio (OR) with a 95% confidence interval (CI) for the risk factors associated with psychological disorders. In all tests, the

confidence interval was considered 95% and *P*-value <0.05 was significant.

Results

Table 1 shows the baseline characteristics of the HSPs. Altogether, 298 HSPs responded to the survey. Of those, 192 (64.4%) were female. The mean age and work experiences of the respondents were 40.51 and 15.0 years, respectively. Regarding cadre type, respondents were 41.3% in the support section, 38.3% in the health section, and 20.5% in hospitals (section of treatment).

Table 2 demonstrated the prevalence and distribution of mental health disorders among health service providers. Overall, 34 (11.4%) of the providers self-reported a history of any mental health disorders. Before the COVID-19 pandemic, 10.4% of providers were presented to psychiatrists while during the COVID-19 pandemic, this measure was 14.1%.

More than 21% of the respondents self-reported any current mental health disorders. Of those, 37.5% and 23.4% of the providers reported depressive and anxiety disorders, respectively. Moreover, during the COVID-19 pandemic, 24 (8.0%) of the providers had received antipsychotic drugs due to COVID-19 worries and risks.

Table 1 The baseline characteristics of the study participants (health service providers)

Variables*	Health service providers (n= 298)	%
Age		
Mean \pm SD	40.51 \pm 8.70	
Work history (year)		
Mean \pm SD	15.0 \pm 8.70	
Sex		
Female	192	64.4
Male	106	35.6
Marital status		
Single	45	15.2
Married	253	48.8
Health service provider type (Cadre type)		
Health service cadre	114	38.3
Hospital service cadre	61	20.5
Support and resource development	123	41.3
Educational level		
Non-academic (under diploma)	31	10.4
High diploma	28	9.4
Bachelor	131	44.0
Master	71	23.8
Doctor and/or higher	37	12.4

*Self-reported

Table 2 Distribution of mental disorder before and during the COVID-19 pandemic among HSPs at Tabriz University of Medical Sciences

Variables	Health service providers (n= 298)	%
History of any mental disorder (prevalence of life)		
Yes	34	11.4
No	264	88.6
Referred to a psychiatrist (before COVID-19)		
Yes	31	10.4
No	267	89.6
Referred to a psychiatrist (during COVID-19)		
Yes	42	14.1
No	256	85.9
Having any mental disorder currently		
Yes	64	21.5
No	234	78.5
Mental disorder type (at currently)		
Depression	24	37.5
Anxiety	15	23.43
Obsessive-compulsive disorder (OCD)	2	0.03
Other	23	36.0
Received any antipsychotics (due to the COVID-19 pandemic)		
Yes	24	8.0
No	274	92.0

Table 3 shows the common mental health symptoms in health service providers at Tabriz University of Medical Sciences in the context of the COVID-19 pandemic. We found that 27 (9.1%) and 73 (24.5%) of respondents had MDD and threshold depressive syndrome, respectively. Altogether, 58% of respondents had any levels of depressive symptoms. The mean score of anxiety was 8.34 in HSPs who worked in treatment (hospitals), 7.18 in HSPs who worked in health, and 5.78 in HSPs who worked in the support section. Overall, 61.7% of respondents had anxiety symptoms. There were significant differences regarding anxiety scores between HSPs groups ($P=0.022$). More than 50% of the HSPs had mild anxiety symptoms while 3.7% of them had severe anxiety symptoms.

Regarding PTSD, 44 (14.8%) and 69 (23.2%) of respondents reported probable and low probable PTSD, respectively. Concerning phobia symptoms, the average score of fear of COVID-19 (7-item scale) was 17.65 ± 6.27 .

To estimate risk factors for MDD in the presence of HSP types, bivariate, and multivariate binary logistic regression analyses were carried out (Table 4). We

found the risk of MDD among healthcare providers who worked in the health and treatment (hospitals) sections is 2.36 and 2.67 times higher than among healthcare providers who worked in the support section. In the final analysis, history of mental illness, types of HSPs, sex, and educational level were found to be associated with MDD.

Discussion

To the best of our knowledge, the current study is the first related to the HSP mental health adverse effects of the COVID-19 pandemic in East Azerbaijan Province, Iran. We found that the COVID-19 pandemic affected the mental health of HSPs.

In this study, 58% of the HSPs had depressive symptoms related to the COVID-19 pandemic. In support of our findings, Asnakew et al. [8] in Ethiopia and Libya [33] were found; 58% of healthcare providers also had depressive symptoms. According to the current study, 9% of HSPs had MDD, and 24.5% had threshold depressive syndrome related to the COVID-19 pandemic. The prevalence of depressive symptoms on HSPs in the current study was higher than the studies performed in China 44% [34], 15.4% [12] Spanish 46% [35] systematic review studies 22.8% [36], and India 11.4% [37]. However, in the present study, the prevalence of depression was lower than the study conducted in Turkey 77.6% [38]. The cause for this difference might be the time of the study conducted in the context of the pandemic, the epidemic curve, and also the study's sample size.

In this survey, the prevalence of MDD was 9.1%. The prevalence of MDD was found 8% in young adults of East Azerbaijan Province in 2020 [19]. Healthcare providers who worked in treatment and health sections showed a positive association with MDD and depression. Moreover, those who had a history of mental health problems, female sex, and had low educational levels were associated with MDD. In a study conducted in China, the prevalence of depressive symptoms (moderate and severe) was 18% [39]. The prevalence of MDD in the general population was reported at 3.6% according to a population-based study in South Korea [40], Danish 3.3%, and review studies [41] 4.7% around the world. In Iran, the prevalence of MDD was estimated at 4.1% (3.1–5.1), in a systematic review and meta-analysis [42]. An increase in the prevalence of depressive symptoms can elevate the probability of suicidal behaviors and suicide re-attempt [43–46].

In our study, the overall prevalence of anxiety symptoms were in line with the studies carried out in Ethiopia 64.7% [8] and Turkey 60.2% [47]. However, it was higher

Table 3 COVID-19-related common mental health symptoms in health service providers at Tabriz Uni Med Sci

Variables	Health service providers (n= 298)				P-value		
	Health	Treatment	Support	Total			
Major depressive disorder (MDD)^a	Yes	14	7	6	27 (9.1)	0.052	
	No	100	54	117	271 (90.9)		
Threshold depressive syndrome^b	Yes	31	14	28	73 (24.5)	0.432	
	No	83	47	95	225 (75.5)		
Depressive symptoms	Non-minimal (0–4)	44	22	59	125 (42.0)	0.477	
	Mild (5–9)	26	19	34	79 (26.5)		
	Moderate (10–14)	25	13	17	55 (18.5)		
	Moderately severe (15–19)	10	3	67	20 (6.7)		
	Severe (20–27)	9	4	6	19 (6.4)		
Probable PTSD (positive for 4 or more items of the 5 items)	Yes	20	10	14	44 (14.8)	0.370	
	No	94	51	109	254 (85.2)		
Low probable PTSD (positive for 3 items of the 5 items)	Yes	30	13	26	69 (23.2)	0.603	
	No	84	48	97	229 (76.8)		
Phobia	Mean ± SD				17.65 ± 6.27	0.248	
	Scale	0–7	10	1	4		15 (5.0)
		8–15	30	22	46		98 (32.9)
		16–23	55	26	57		138 (46.3)
		24–31	16	10	12		38 (12.8)
		≥ 32	3	1	4		8 (2.7)
Anxiety	Mean ± SD		7.18± 5.7	8.34±5.9	5.78±4.9	6.96 ± 5.60	0.022
	Scale	Minimal: 0–4	72	16	42	130 (52.7)	
		Mild: 5–9	64	14	34	112 (27.9)	
		Moderate: 10–14	35	9	13	57 (15.1)	
		Severe: 15–21	24	10	7	41 (3.7)	

^a MDD is suggested if: of the 9 items, 5 or more are checked as at least “more than half the days” and/or either item 1 or 2 is checked as at least “more than half the days”

^b Threshold depressive symptoms are suggested if: of the 9 items, between 2 and 4 are checked as at least “more than half the days” and/or either item 1 or 2 is checked as at least “more than half the days”

than the studies performed in Spain 58.6% [48] and China 44.6% [49] and 38% [50].

Concerning other mental health disorders, 15% of HSPs had probable PTSD, and 23.2% had low probable PTSD. Furthermore, the average score of fear scale related to COVID-19 was 16.65. Similarly, a study in Egypt found the mean of the fear of COVID-19 scale was 17.7 during the COVID-19 pandemic.

The findings in this study were in line with the studies conducted in Egypt. Abdelghani M et al. [51] found there was a robust correlation between HSPs who perceived fears and higher burnout symptoms. Likewise, a population-based study in Canada [52] indicated that HSP stigmatization is associated with COVID-19 stress syndrome. Similarly, a study in Bangladesh [53] found nearly over 1/4 of the HSPs had depression and was significantly related to COVID-19 fear.

In a systematic review and meta-analysis [54] that was pooled across 65 studies involving 97,333 healthcare

workers across 21 countries, the prevalence of PTSD was 21.5% (95% CI, 10.5–34.9%).

Correspondingly, the prevalence of probable PTSD was in line with a review study (16.7%) [16]. This study found negative emotions and threats and/or physical tension are reliable predictors of PTSS. HSPs who suffered from higher levels of PTSS scored positively for insomnia and exhibited significantly higher PTSD.

Conclusions

The study findings demonstrated that HSPs are affected by the high level of depression, PTSD, fear, and anxiety during the COVID-19 pandemic. We found the score of psychological symptoms among HSPs who were directly exposed (treatment and health cadre) to COVID-19 patients is more than indirectly exposed (support) HSPs. The COVID-19 pandemic has disrupted the mental health status of HSPs and the need for mental health services is increasing.

Table 4 Association between MDD and health service provider type during the COVID-19 pandemic by multiple logistic regression analysis after adjusting for the potential confounders

Variables	Crude OR; 95% CIs	P-value	Adjusted OR; 95% CIs	P-value
Healthcare type				
Support	1	1	1	1
Health	2.73 (1.01–7.37)	0.047	2.36 (0.85–6.57)	0.100
Treatment	2.53 (0.81–7.88)	0.110	2.67 (0.84–8.50)	0.097
History of mental disorder				
No	1	1	1	1
Yes	3.16 (1.22–8.16)	0.027	3.14 (1.19–8.30)	0.021
Sex				
Male	1	1	1	1
Female	2.01 (1.02–4.50)	0.042	2.25 (0.82–6.32)	0.122
Age				
<30	1.48 (0.74–2.97)	0.265	1.54 (0.74–3.24)	0.250
>30	1	1	1	1
Marital status				
Single	1	1	1	1
Married	1.0 (0.49–2.10)	0.982	1.06 (0.48–2.33)	0.887
Educational level				
	0.73 (0.57–0.93)	0.012	0.72 (0.54–0.95)	0.024

Recommendations

This study highlights the demand for high-quality services and evidence-based interventions for the HSPs' well-being during the COVID-19 pandemic. This study also showed the need for support systems and coping strategies that may assist to decrease stress, PTSD, and depression among HSPs [55].

Abbreviations

HSP: Health service provider; COVID-19: Coronavirus disease 2019; GAD: General anxiety disorder; PTSD: Post-traumatic stress disorder; MDD: Major depression disorder; PHQ: Patient health questionnaire.

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Authors' contributions

AF and MF designed the original idea and developed the protocol. HA developed the manuscript and did the analysis. MF contributed to the manuscript development, data collection, analysis, interpretation, and edition. HB, SN, and VA contributed to the protocol development and revised and reviewed the protocol, data collection, and interpretation. All authors approved the final submitted version.

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee, Tabriz University of Medical Sciences, under the code IR.TBZMED.REC.1400.991. We confirm that all methods were performed in accordance with the relevant guidelines and regulations. Written informed consent was obtained before the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests regarding this study and its publication.

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References

- Nakhlband A, Fakhari A, Azizi H (2021) Interferon-alpha position in combating with COVID-19: A systematic review. *J Med Virol* 93(9):5277–5284
- Davtalab-Esmaili E, Fakhari A, Naghili B, Khodamoradi F, Azizi H (2022) Case fatality and mortality rates socio-demographic profile and clinical features of COVID-19 in the elderly population: A population-based registry study in Iran. *J Med Virol* 94(5):2126–2132. <https://doi.org/10.1002/jmv.27594>
- Elbqry MG, Elmansy FM, Elsayed AE, Mansour B, Tantawy A, Eldin MB, Sayed HH (2021) Effect of COVID-19 stressors on healthcare workers' performance and attitude at Suez Canal university hospitals. *Middle East Curr Psychiatry* 28(1):1–8

4. Mohamed AE, Yousef AM (2021) Depressive, anxiety, and post-traumatic stress symptoms affecting hospitalized and home-isolated COVID-19 patients: a comparative cross-sectional study. *Middle East Curr Psychiatry* 28(1):1–12
5. Elhadi M, Mshergahi A, Elgzairi M, Alhashimi A, Bouhuwaish A, Biala M, Abuelmeda S, Khel S, Khaled A, Alsoufi A (2020) Psychological status of healthcare workers during the civil war and COVID-19 pandemic: a cross-sectional study. *J Psychosomatic Res* 137:110221
6. Azizi H, Davtalab-Esmaeili E (2020) Iranian first-line health care providers practice in COVID-19 outbreak. *Iran J Public Health* 49(Suppl 1):119–121
7. Shaker NM, Sabry N, Alkasaby MA, Rabie M (2021) Predictors of stress among a sample of Egyptian healthcare providers during the COVID-19 pandemic. *Middle East Curr Psychiatry* 28(1):1–6
8. Asnakew S, Amha H, Kassew T (2021) Mental health adverse effects of COVID-19 pandemic on health care workers in North West Ethiopia: a multicenter cross-sectional study. *Neuropsychiatr Dis Treat* 17:1375
9. Sultan S, Bashar A, Nomani I, Tabassum A, Iqbal MS, Fallata EO, Sindi RA, Almasoudi NM, Rheem S (2022) Impact of COVID-19 pandemic on psychological health of a sample of the health care workers in the western region of Kingdom of Saudi Arabia. *Middle East Curr Psychiatry* 29(1):1–11
10. Serrano-Ripoll MJ, Meneses-Echavez JF, Ricci-Cabello I, Fraille-Navarro D, Fiol-deRoque MA, Pastor-Moreno G, Castro A, Ruiz-Pérez I, Campos RZ, Gonçalves-Bradley DC (2020) Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review and meta-analysis. *J Affect Disord* 277:347–357
11. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R (2020) Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA network open* 3(3):e203976
12. Zheng R, Zhou Y, Qiu M, Yan Y, Yue J, Yu L, Lei X, Tu D, Hu Y (2021) Prevalence and associated factors of depression, anxiety, and stress among Hubei pediatric nurses during COVID-19 pandemic. *Comprehens Psychiatry* 104:152217
13. Vizheh M, Qorbani M, Arzaghi SM, Muhidin S, Javanmard Z, Esmaeili M (2020) The mental health of healthcare workers in the COVID-19 pandemic: a systematic review. *J Diabetes Metab Disord* 19(2):1967–1978
14. Saragih ID, Tonapa SI, Saragih IS, Advani S, Batubara SO, Suarilah I, Lin C-J (2021) Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: a systematic review and meta-analysis. *Int J Nurs Stud* 121:104002
15. Romero CS, Delgado C, Catalá J, Ferrer C, Errando C, Iftimi A, Benito A, De Andres J, Otero M (2022) COVID-19 psychological impact in 3109 healthcare workers in Spain: The PSIMCOV group. *Psychol Med* 52(1):188–194
16. Marvaldi M, Mallet J, Dubertret C, Moro MR, Guessoum SB (2021) Anxiety, depression, trauma-related, and sleep disorders among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Neurosci Biobehav Rev* 126:252–264
17. Kroenke K, Spitzer RL, Williams JB (2001) The PHQ-9: validity of a brief depression severity measure. *J Gen Int Med* 16(9):606–613
18. Martin A, Rief W, Klaiberg A, Braehler E (2006) Validity of the brief patient health questionnaire mood scale (PHQ-9) in the general population. *Gen Hosp Psychiatry* 28(1):71–77
19. Fakhari A, Farahbakhsh M, Azizi H, Davtalab-Esmaeili E, Mirzapour M, Rahimi VA, Hashemi L, Gaffarifam S (2020) Early marriage and negative life events affect on depression in young adults and adolescents. *Arch Iran Med* 23(2):90–98
20. Dadfar M, Kalibatseva Z, Lester D (2018) Reliability and validity of the Farsi version of the Patient Health Questionnaire-9 (PHQ-9) with Iranian psychiatric outpatients. *Trends Psychiatry Psychother* 40:144–151
21. Dadfar M, Salabifard S, Dadfar T, Roudbari M, Moneni Safarabad N (2019) Validation of the patient health questionnaire-2 with Iranian students. *Mental Health Religion Culture* 22(10):1048–1056
22. Maroufzadeh S, Omani-Samani R, Almasi-Hashiani A, Amini P, Sepidarkish M (2019) The reliability and validity of the Patient Health Questionnaire-9 (PHQ-9) and PHQ-2 in patients with infertility. *Reproductive Health* 16(1):1–8
23. Spitzer RL, Kroenke K, Williams JB, Löwe B (2006) A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Int Med* 166(10):1092–1097
24. Naeinian M, Shairi M, Sharifi M, Hadian M (2011) To study reliability and validity for a brief measure for assessing Generalized Anxiety Disorder (GAD-7)
25. Omani-Samani R, Maroufzadeh S, Ghaheeri A, Navid B (2018) Generalized anxiety Disorder-7 (GAD-7) in people with infertility: a reliability and validity study. *Middle East Fertil Soc J* 23(4):446–449
26. Zakeri MA, Rafsanjanipoor SMH, Kahnooji M, Heidari FG, Dehghan M (2021) Generalized anxiety disorder during the COVID-19 outbreak in Iran: the role of social dysfunction. *J Nerv Mental Dis* 209(7):491–496
27. Veisy F, Farahani H, Togha M, Gharaee B, Janani L, Aghebbati A (2021) Rapid screening for generalized anxiety disorder in patients with migraine. *Curr J Neurol* 20(2):102
28. Ahorsu DK, Lin C-Y, Imani V, Saffari M, Griffiths MD, Pakpour AH (2020) The fear of COVID-19 scale: development and initial validation. *Int J Mental Health Addiction* 20(3):1537–1545. <https://doi.org/10.1007/s11469-020-00270-8>
29. Khalaf OO, Abdalgeleel SA, Mostafa N (2022) Fear of COVID-19 infection and its relation to depressive and anxiety symptoms among elderly population: online survey. *Middle East Curr Psychiatry* 29(1):1–8
30. Prins A, Bovin MJ, Smolenski DJ, Marx BP, Kimerling R, Jenkins-Guarnieri MA, Kaloupek DG, Schnurr PP, Kaiser AP, Leyva YE (2016) The primary care PTSD screen for DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. *J Gen Int Med* 31(10):1206–1211
31. Vera M, Juarbe D, Hernández N, Obén A, Pérez-Pedrogo C, Chaplin WF (2012) Probable posttraumatic stress disorder and psychiatric co-morbidity among Latino primary care patients in Puerto Rico. *J Depress Anxiety* 1(5):124
32. Azizi H, Fakhari A, Farahbakhsh M, Davtalab-Esmaeili E, Mirzapour M (2021) Outcomes of community-based suicide prevention program in primary health care of Iran. *International Journal of Mental Health Systems* 15(1):67. <https://doi.org/10.1186/s13033-021-00492-w>
33. Straat JH, van der Ark LA, Sijtsma K (2013) Methodological artifacts in dimensionality assessment of the Hospital Anxiety and Depression Scale (HADS). *J Psychosomatic Res* 74(2):116–121
34. Que J, Le Shi JD, Liu J, Zhang L, Wu S, Gong Y, Huang W, Yuan K, Yan W, Sun Y (2020) Psychological impact of the COVID-19 pandemic on healthcare workers: a cross-sectional study in China. *Gen Psychiatry* 33(3):e100259. <https://doi.org/10.1136/gpsych-2020-100259>
35. Luceño-Moreno L, Talavera-Velasco B, García-Albuera Y, Martín-García J (2020) Symptoms of posttraumatic stress, anxiety, depression, levels of resilience and burnout in Spanish health personnel during the COVID-19 pandemic. *Int J Environ Res Public Health* 17(15):5514
36. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P (2020) Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun* 88:901–907
37. Wilson W, Raj JP, Rao S, Ghiya M, Nedungalaparambil NM, Mundra H, Mathew R (2020) Prevalence and predictors of stress, anxiety, and depression among healthcare workers managing COVID-19 pandemic in India: a nationwide observational study. *Indian J Psychol Med* 42(4):353–358
38. Şahin MK, Aker S, Şahin G, Karabekiroğlu A (2020) Prevalence of depression, anxiety, distress and insomnia and related factors in healthcare workers during COVID-19 pandemic in Turkey. *J Commun Health* 45(6):1168–1177
39. Chen J, Liu X, Wang D, Jin Y, He M, Ma Y, Zhao X, Song S, Zhang L, Xiang X (2021) Risk factors for depression and anxiety in healthcare workers deployed during the COVID-19 outbreak in China. *Soc Psychiatry Psychiatr Epidemiol* 56(1):47–55
40. Ohayon MM, Hong S-C (2006) Prevalence of major depressive disorder in the general population of South Korea. *J Psychiatr Res* 40(1):30–36
41. Ferrari A, Somerville A, Baxter A, Norman R, Patten S, Vos T, Whiteford H (2013) Global variation in the prevalence and incidence of major depressive disorder: a systematic review of the epidemiological literature. *Psychol Med* 43(3):471–481
42. Sadeghirad B, Haghdoost A-A, Amin-Esmaeili M, Ananloo ES, Ghaeli P, Rahimi-Movaghar A, Talebian E, Pourkhandani A, Noorbala AA, Barooti E (2010) Epidemiology of major depressive disorder in Iran: a systematic review and meta-analysis. *Int J Prev Med* 1(2):81
43. Fakhari A, Allahverdipour H, Davtalab-Esmaeili E, Chattu VK, Salehiniya H, Azizi H (2022) Early marriage stressful life events and risk of suicide and suicide attempt: a case-control study in Iran. *BMC Psychiatry* 22(1):71. <https://doi.org/10.1186/s12888-022-03700-0>
44. Fakhari A, Farahbakhsh M, Davtalab-Esmaeili E, Azizi H (2021) A longitudinal study of suicide and suicide attempt in northwest of Iran: incidence predictors and socioeconomic status and the role of socio-cultural status. *BMC Public Health* 21(1):1486. <https://doi.org/10.1186/s12889-021-11527-9>

45. Farahbakhsh M, Fakhari A, Davtalab-Esmaili E, Azizi H, Mohammad M, Rahimi VA, Hashemi L (2020) The Role and Comparison of Stressful Life Events in Suicide and Suicide Attempt: A Descriptive-Analytical Study. *Iranian Journal of Psychiatry and Behavioral Sciences* 14(2). <https://doi.org/10.5812/ijpbs.96051>
46. Esmaili ED, Farahbakhsh M, Sarbazi E, Khodamoradi F, Gaffari Fam S, Azizi H (2020) Predictors and incidence rate of suicide re-attempt among suicide attempters: A prospective study. *Asian J Psychiatr* 69:102999. <https://doi.org/10.1016/j.ajp.2021.102999>
47. Alasad J, Tabar NA, AbuRuz ME (2015) Patient satisfaction with nursing care. *J Nurs Admin* 45(11):563–568
48. Donnelly E (2012) Work-related stress and posttraumatic stress in emergency medical services. *Prehospital Emerg Care* 16(1):76–85
49. Morina N, Malek M, Nickerson A, Bryant RA (2017) Psychological interventions for post-traumatic stress disorder and depression in young survivors of mass violence in low-and middle-income countries: meta-analysis. *Bri J Psychiatry* 210(4):247–254
50. de Boer J, Lok A, Van't Verlaat E, Duivendoorn H, Bakker A, Smit B (2014) Work-related critical incidents in hospital-based health care providers and the risk of Rev. *Latino Am Enfermagem* 22(2):332–336 post-traumatic stress symptoms, anxiety, and depression: a meta-analysis. *Soc Sci Med* 2011, 73(2):316–326
51. Abdelghani M, El-Gohary HM, Fouad E, Hassan MS (2020) Addressing the relationship between perceived fear of COVID-19 virus infection and emergence of burnout symptoms in a sample of Egyptian physicians during COVID-19 pandemic: a cross-sectional study. *Middle East Current Psychiatry* 27(1):1–9
52. Taylor S, Landry CA, Rachor GS, Paluszek MM, Asmundson GJ (2020) Fear and avoidance of healthcare workers: An important, under-recognized form of stigmatization during the COVID-19 pandemic. *J Anxiety Disord* 75:102289
53. Sakib N, Akter T, Zohra F, Bhuiyan A, Mamun MA, Griffiths MD (2021) Fear of COVID-19 and depression: a comparative study among the general population and healthcare professionals during COVID-19 pandemic crisis in Bangladesh. *Int J Mental Health Addict* 19:1–17. <https://doi.org/10.1007/s11469-020-00477-9>
54. Li Y, Scherer N, Felix L, Kuper H (2021) Prevalence of depression, anxiety and post-traumatic stress disorder in health care workers during the COVID-19 pandemic: A systematic review and meta-analysis. *PloS One* 16(3):e0246454
55. Farahbakhsh M, Fakhari A, Azizi H, Davtalab-Esmaili E (2020) Structure, Characteristics and Components of COVID-19 Surveillance System. *J Mil Med* 22(6):534–541

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