

Research Article

The Psychological Impact of the COVID-19 Pandemic on Health Professionals in Sudan 2020

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Abstract

Background: The 2019 novel coronavirus (COVID-19) is highly contagious with pandemic transmission, and is therefore associated with severe health problems and high public anxiety, with healthcare community speculation to be the most distressed because they are at the highest risk of infection. This study aimed to investigate the psychological impact on frontline medical staff in Khartoum state, Sudan, during the COVID-19 pandemic between January and March 2020.

Materials and Methods: Patient Health Questionnaire-9 (PHQ-9) scale, Generalized Anxiety Disorders (GAD-7) scale, and the Revised Impact of Event Scale (IES-R) were used to assess depression, anxiety, and Post-traumatic Stress Disorders (PTSD) on the participants, respectively, through an online questionnaire. The data were analyzed using the Statistical Package for Social Science (SPSS) version 24.

Results: PHQ-9 depression scale showed that 285 (82%) staff members had some degree of depression, with mild depression being the most frequent, seen in 96 (24.2%), whereas, severe depression was found to be more common among the age group between 45 and 65 years and was associated with working in the emergency room (ER) ($P = 0.03$). The PTSD among our participants was assessed by the IES-R that showed that 116 (29.3%) had subclinical PTSD, 124 (31.3%) had mild PTSD symptoms, 98 (24.7%) had moderate PTSD symptoms, and 58 (14.6%) had severe PTSD symptoms. Also, a statistical association was seen between the IES-R mean score and the age group between 25 and 34 years ($P < 0.0001$), having a friend or family member infected with the disease ($P < 0.0001$), and having a history of contact with a positive case of COVID-19 ($P < 0.0001$). We used GAD-7 anxiety score that showed mild anxiety in 32 (23.2%) participants, moderate anxiety in 53 (13.4%), and severe anxiety 66 (16.7%).

Conclusion: This study aimed to explore the psychological impact of COVID-19 pandemic on medical staff's perception and its determinants. Most of our participants were found to be suffering from anxiety and depression with combining personal variables and working conditions as predictors.

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Keywords: COVID-19, psychological impact, health workers, Sudan, GAD-7, PHQ-9, IES-R

1. Introduction

Over the last century, the world has witnessed great pandemics with potentially destructive effects. Starting from the “Spanish” influenza that swept through the world between 1918 and 1919 and to the severe acute respiratory syndrome (SARS) crisis in November 2003, caused by a novel corona virus that resulted in the death of 349 out of 5327 patients [1].

Since December 2019, an outbreak of severe acute respiratory infection of unknown etiology had emerged in Wuhan City, the capital of Hubei Province, China. Later, a third generation of Corona virus was suspected and the name COVID-19 was given to this novel disease; it gained extreme awareness nationwide and internationally, and was declared as a public health emergency of international concern by the World Health Organization (WHO) on January 30, 2020. A strict range of preventive measures were urgently adopted, including complete social distancing, contact tracing, early identification using regional and national diagnostic criteria besides isolation of suspected and diagnosed cases. All these scientific and valid measures have resulted in a remarkable and striking decline in the virus transmission rate [2, 3].

Pandemic infectious diseases not only are life-threatening to human beings, but greatly impose psychosocial trauma to people because most people usually lack sufficient knowledge about newly emerging diseases, which brings about massive panic in people and leads to an illogical response to the disease [4].

Medical personnel, including paramedics, ambulance personnel, and healthcare workers (HCWs) have been found to be more psychologically traumatized and experience higher levels of stress, depression, and anxiety [5]. This can be explained by the expected anxiety and fear of getting infected due to their risk of exposure and worse is their worry of infection transmission to their families, friends, or colleagues. This puts them at a great challenge of how to balance between professional duty, humanity, and personal fear for oneself and others, a situation that can often cause conflict and dissonance in many HCWs [6].

The SARS epidemic, with high transmission and mortality rates, caused significant terror and apprehension around the world [7–10].

The literature has revealed that HCWs are not at equal risk for developing an adverse psychological sequence; healthcare providers who are in proximal contact with patients and are directly exposed to infection are found to be more vulnerable to developing adverse psychiatric problems. These include healthcare providers in emergency departments, intensive care units, and isolation wards [11].

Apart from the exposure, health workers may suffer from panic and worry of getting sick or dying, feel helpless, or face blame from others who are ill, all precipitating a state of mental collapse [12].

Different presentations of psychiatric illnesses have been found, ranging from depression, anxiety, panic attacks, somatic symptoms, and post-traumatic stress disorder symptoms to delirium, psychosis, and even suicide [13]. These symptoms have been associated with a younger age and increased feelings of self-guilt [13–15]; stigmatization, and social avoidance had also been reported by Bai *et al.* and Robertson *et al.* 2004.

In a survey conducted during the initial outbreak of COVID-19 in China to assess the psychological effect, the result showed that 53.8% of respondents rated the psychological impact of the outbreak as moderate or severe [16].

The effect of infectious pandemics extends beyond the healthcare providers to reach the whole healthcare system [12]. As during the outbreak, some hospitals were closed with cancellation of all hospital-based outpatient clinics, severe staff shortages resulted from quarantined health workers [17–22].

During the SARS outbreak, marital status was also found to be associated with stress level, where an elevated fear was reported to be more in married hospital employees compared to those who were divorced or unmarried [23].

Quarantine is an essential and effective preventive measure during an epidemic, although it is often an unpleasant experience for those who go through it [24]. To minimize the adverse effects of quarantine, officials need to ensure that quarantined households have enough supplies for their basic needs [25].

This study was designed to examine the long-term psychological impact of COVID-19 outbreak on healthcare workers in Khartoum state, and aimed to identify personal and environmental variables that increase vulnerability to distress during an epidemic.

2. Materials and Methods

2.1. Participants

This is a cross-sectional study that targeted medical staffs in Khartoum state, Sudan, during the COVID-9 pandemic. The sample consisted of 396 healthcare providers; the questionnaire was restricted to respondents who had to authenticate their membership to their specialty through their social media groups.

The sample was stratified by profession, including different groups of healthcare workers, doctors, nurses, dentists, pharmacists, and laboratory workers. Disproportionate stratified random sample was used for recruitment into the study because our sample size is not proportional to the relative size of the strata and to compensate for the small number of certain groups.

Sample size was calculated using the sample size of the unknown population (Cochran's formula):

$$n_0 = \frac{z^2 p(1-p)}{e^2}.$$

z = z value (1.96 for 95% confidence interval)

p = degree of variability (0.5)

e = 95 % confidence interval

$$n = (1.96)^2 \times 0.5(1-0.5) \div (0.05)^2 = 384$$

2.2. Measures

A validated questionnaire containing sociodemographic characteristics, Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorders-7 (GAD-7) scale, and the Revised Impact of Event Scale (IES-R) were used to assess depression, anxiety, and post-traumatic stress disorder on the participants, respectively.

The IES-R is a short, easy, and self-report measure designed to assess current subjective distress resulting from a traumatic life event for both healthy as well as frail individuals and is composed of 22 items, each one of which is rated using a Likert scale from 0 to 4. The maximum score is 88. The results consist of a total raw score and raw score for three subscales: the avoidance scale, intrusion scale, and the hyperarousal scale [26]. The event used for this questionnaire was the exposure to or infection by COVID-19. The total scores were categorized as follows: subclinical (0–8), mild distress (9–25), moderate distress (26–43), and severe distress (44–88) [27].

PHQ-9 scale contains nine questions to measure depressive symptoms, each question contains four options ranging from (not at all) given zero points to (nearly every day) given three points and the result is interpreted as (0–4) having minimal or no depression, (5–9) having mild depression, (10–14) having moderate, (15–19) having moderately severe, and (20–27) having severe depression [28].

The GAD scale contains seven questions and is used to measure the anxiety symptoms in the participants, each question contains four options ranging from (not at all) to (nearly every day) given a three point result and interpreted as (5–9) for mild anxiety, (10–14) moderate anxiety, and (> 15) for severe anxiety [29].

As Arabic or Sudanese versions are not available, the English version of IES-R and GAD scales was translated into Arabic language by two bilingual persons whose native language is Arabic and English. The Arabic version was translated back into English by two independent bilingual persons and both the new and original English versions were compared. The Arabic version of PHQ-9 is available [30] and was used after the consent was taken from the developer. A pilot study was conducted in 10% of the sample (~ 38 participants) with a Cronbach's alpha of (0.925), (0.944), and (0.946) for PHQ-9, IES-R, and GAD-7 respectively.

2.3. Procedure

As our study was conducted in unusual circumstances, in which there were restrictions on most activities and movements, and person-to-person contacts were maximally reduced due to the fear of the spread of COVID-19 infection, the data were collected using an Internet-mediated questionnaire.

2.4. Data analysis

The data were analyzed using the Statistical Package for Social Science (SPSS) version 24, after being primarily analyzed by Google form. Descriptive analysis was used to describe the demographic data and the COVID-19 exposure and perception and included the mean and standard deviation (SD). As the Wilk–Shapiro test showed a significant deviation from the normal distribution (P -value < 0.0001), the demographic data and the COVID-19 exposure and perception were compared to IES-R scores using the independent samples Kruskal–Wallis and the Mann–Whitney tests. The demographic data and COVID-19 exposure and perception were also compared to GAD-7 and PHQ-9 scores using Chi-square (χ^2) test. A P -value < 0.05 was considered statistically significant.

3. Results

3.1. Demographic characteristics

In our study, we enrolled 396 healthcare providers, the majority, that is, 203 (51.3%) of them were between 25 and 34 years of age, and among them 262 (66.2%) were females and 124 (33.8%) were males. The majority, that is, 258 (65.2%) were single, while 110 (27.8%) were married. Bachelor holders were 243 (61.4%) and 202 (51.01) of our participants worked in governmental hospitals. About 171 (43.2%) stated that they worked in the Emergency Room (ER) (Table1).

3.2. COVID 19 exposure and perception

Regarding the COVID 19 exposure and perception, we found that 76 (19.2%) of our participants responded that they handled COVID 19 cases, while 65 (16.4%) had a friend or family member diagnosed with COVID 19. The majority, that is, 317 (80.1%) of our participants stated that their families are worried and afraid that they will transmit the disease to them. About 140 (35.4%) of our participants thought that people started to avoid them because of the nature of their job, and 249 (62.9%) of them stated that their income got lowered during the COVID 19 pandemic, while 256 (65.6%) thought that their working hours were increased during this time. When asked about the availability of enough Personal Protective Equipment in their workplace, 289 (73%) responded with the answer "no," and only 57 (14.4%) pointed to the availability of mechanical ventilators in their workplace (Table 2). About 108 (27.3%) of our participants went through home isolation during the COVID 19 pandemic. On asking them about the reason for their home isolation, 33 (8.3%) reported a confirmed case after contact with another confirmed case, and 20 (5.1%) were positive cases. Also, 25 (6.3%) of them reported contact with a suspected case, 9 (2.3%) reported contact with confirmed case, 1 participant (0.3%) reported developing symptoms as a cause of isolation, and 4 (1%) reported other causes (Table 3). About 187 (47.2%) of them stated that they get information from TV, radio, and

social media, while 114 (25.8%) reported getting their information from social media and official websites (Table 4).

3.3. Depression among participants

Upon evaluating depression among our participants using the PHQ9 Scale, we found that 285 (82%) of them perceived some degree of depression, with mild depression being the most common in 96 participants (24.2%), followed by moderate depression in 80 (20.2%), while moderately severe and severe depression were among 47 (11.9%) and 62 (15.7%) participants, respectively (Figure 1).

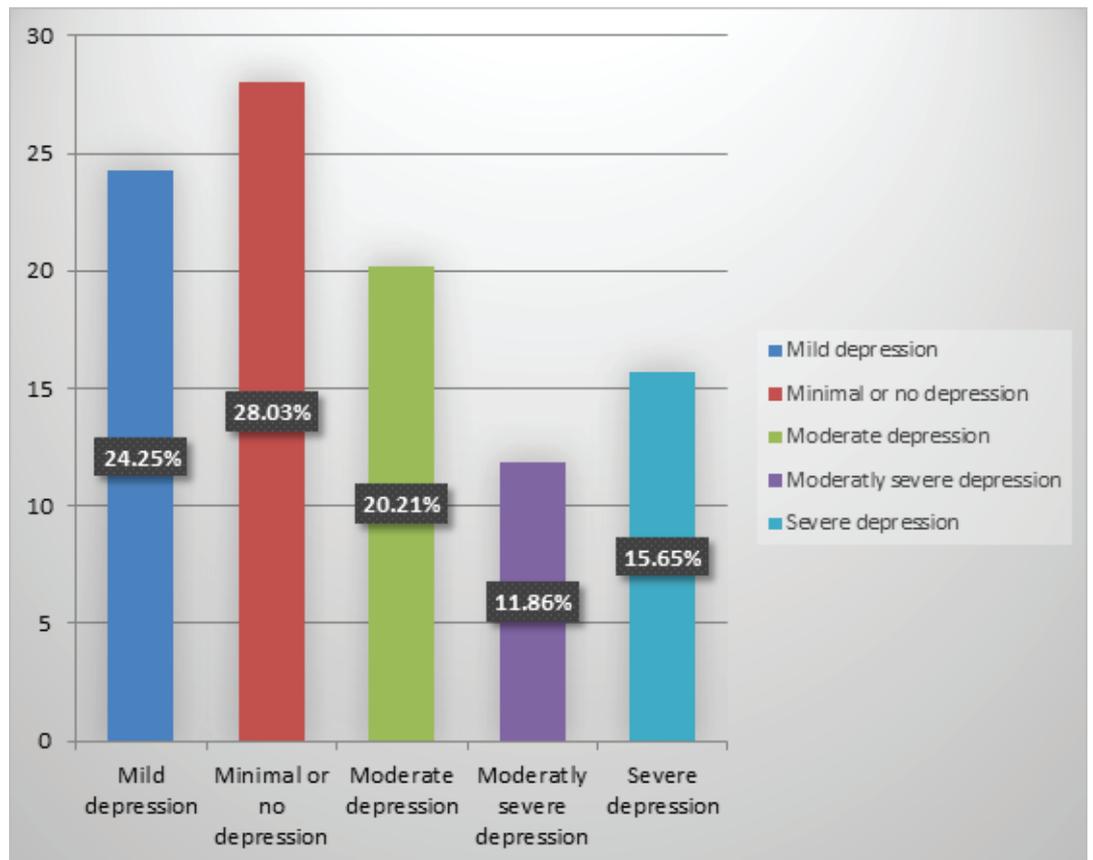


Figure 1: PHQ-9 depression score among participants.

We explored the association between depressive level and participant's demographic characteristics and found that those of the age group 45–54 years were having severe depression, but this association was statistically insignificant ($p = 0.2$).

On the other hand, we found that working in an ER is associated with both a high prevalence of depression and a higher percentage of severe depression ($p = 0.03$). There are no significant associations with COVID-19 exposure and perception of depression.

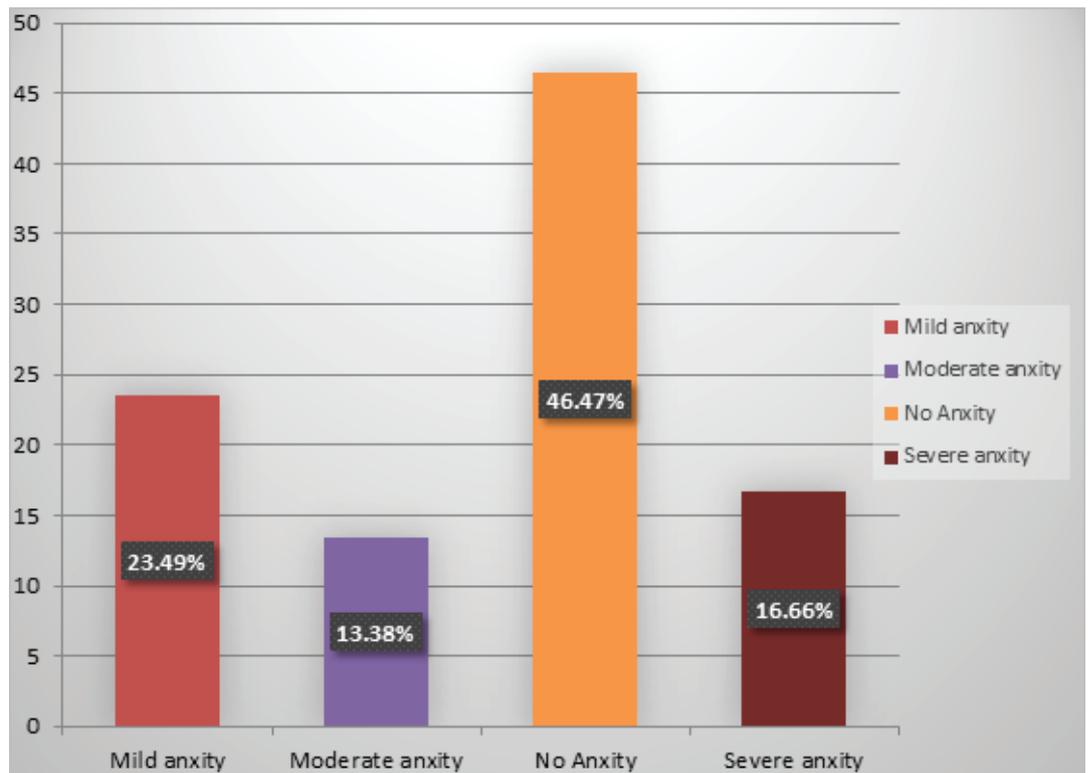


Figure 2: GAD-7 Score among participants.

3.4. Post-traumatic stress disorder among participants

The IES-R scale and its subscales were used to evaluate the post-traumatic stress disorder among our participants, and the result showed that 116 (29.3%) had subclinical PTSD, 124 (31.3%) had mild PTSD symptoms, 98 (24.7%) had moderate PTSD symptoms, and 58 (14.6%) had severe PTSD symptoms. On the other hand, on reviewing the subscales, we found that the participants in our study had a mean of 0.99 in the avoidance scale, 1.05 for the intrusion scale, and 1.026 for the hyperarousal scale (Table 5).

We further evaluated the association between the age groups and the educational level of the participants. A higher mean IES-R score was found in the age group between 25 and 34 years and in master degree holders (P -value < 0.0001) (Table 6). Health workers who had no history of contact with an infected patient or no friend or family member infected with the disease had a significantly higher mean IES-R score compared to those who did (P -value < 0.0001).

When we explored the effect of working conditions, result showed that participants who did not had enough PPE in their workplace had significantly lower mean IES-R compared to those who did (P -value < 0.0001). No significant difference was found between the person who had been quarantined and the person who had not (Table 6).

TABLE 1: Demographic characteristics

Variables		Number	Percentage (%)
Age	18–24 years	104	26.3
	25–34 years	203	51.3
	35–44 years	40	10.1
	45–54 years	10	2.5
	55–64 years	16	4
	Above 65 years	23	5.8
Gender	Male	124	33.8
	Female	262	66.2
Marital status	Single	258	65.2
	Married	110	27.8
	Widows	13	3.3
	Divorced	15	3.8
Current occupational position	House officers	122	30.8
	Medical officers	93	23.5
	Registrars	53	13.4
	Specialists	21	5.3
	Consultants	19	4.8
	Consultants	19	4.8
	Nurses	21	5.3
	Lab technicians	35	8.8
	Pharmacists	17	4.3
	Dentists	12	3.0
	Physiotherapist	1	0.3
	Radiology technician	1	0.3
	Health officer	1	0.3
Educational qualification	Bachelor	255	64.4
	Master	58	14.6
	MD/PHD	80	20.2
	Diploma	3	0.8
Current workplace	Governmental hospital	202	51.01
	Private hospital	48	12.12
	Both private and governmental hospitals	79	19.94
	Private clinics	39	9.84
	Primary health care center	19	3.03
	Pharmacies	9	2.3
	Private labs	6	1.51
	Blood bank	1	0.25
Direct contact with the Emergencies	Emergency Room	171	43.2
	Respiratory area	59	12.9
	Isolation room	9	2.3
	X-ray room	6	1.5
	Not working in any of them	151	38.1

TABLE 2: COVID 19 exposure and perception

	Yes		No	
	N	%	N	%
Handling a positive patient	76	19.2	320	80.8
Any friend or family member positive for COVID 19	65	16.4	331	83.6
Fear of friends/family members of transmitting the disease	317	80.1	79	19.9
Avoidance of community member from participants	195	49.2	201	50.8
Income reduction during COVID 19 pandemic among participants	249	62.9	147	37.1
Increase in working hours during COVID 19 pandemic among participants	140	35.4	256	65.6
PPE availability in enough amounts in workplace	107	27	289	73
Ventilator availability in workplace	57	14.4	339	85.6
Home isolation among participants	108	27.3	288	72.7

TABLE 3: Cause of home isolation of the participants

Cause of home isolation	Frequency	Percentage
Didn't have home isolation	288	72.7
Diagnosed with the disease	20	5.1
Exciting in place with confirmed case	1	.3
Direct contact with confirmed case	9	2.3
Direct contact with suspected case	25	6.3
Been suspected case	11	2.8
Direct contact with person who had direct contact with confirmed	3	.8
Diagnosed with the disease; direct contact with confirmed case	33	8.3
Come from infected country	1	.3
Other	4	1.0
Feeling symptoms	1	.3
Total	396	100.0

TABLE 4: Source of participants' information about COVID 19

Source of information	Frequency	Percentage
TV and radio	8	2.0
Social media	25	6.3
Official health website	114	28.8
TV and radio; social media	187	47.2
Social media and official health website	37	9.3
TV and radio and official health website	21	5.3
TV and radio; social media and official health website	4	1.0
Total	396	100.0

TABLE 5: IES-R subscales among participants

IES-R Subscales	N	Range	Minimum	Maximum	Mean	Std. Deviation
Avoidance Score	396	3.13	0.00	3.13	0.9953	0.85860
Intrusion Score	396	3.13	0.00	3.13	1.0581	0.91304
Hyperarousal Score	396	3.17	0.00	3.17	1.0261	0.94058
Valid N (listwise)	396					

TABLE 6: Comparison of demographic characteristics and COVID-19 exposure and perception with IES-R scale

Variable		Frequency	IES-R Mean SD		P-value
Age	18–24	104	22.1	19.3	< 0.0001
	25–34	203	24.6	16.9	
	35–44	40	22.4	16.8	
	45–54	10	21.0	23.4	
	55–64	16	18.9	26.7	
	+65	23	9.9	23.2	
Educational level	Master	58	25.4	18.3	< 0.0001
	PHD/MD	80	15.6	22.3	
	Bachelor	255	24.1	17.2	
	Diploma	3	18.3	18.9	
Dealing with infected person	Yes	76	11.8	16.9	< 0.0001
	No	320	25.1	18.3	
Infected friend or family member	Yes	65	8.0	14.9	< 0.0001
	No	331	25.4	18.1	
Availability of PPE in enough amounts in workplace	Yes	107	29.7	21.5	< 0.0001
	No	289	19.9	17.0	

3.5. Anxiety among participants

We used GAD-7 score to evaluate anxiety among our participants, we found that most of our participants had scored different levels of anxiety ranging from mild anxiety in 32 (23.2%), moderate anxiety in 53 (13.4%), and severe anxiety in 66 (16.7%) (Figure 2).

When we evaluated the association of the GAD-7 score with our participant's personal characteristics, we found that those aged 24–35 years had the lowest GAD-7 score compared to other age groups ($P = 0.001$); those who worked in the ER had a significantly higher GAD-7 scores than those who were working in other departments ($P = 0.034$); and those who hold bachelor degree had lower GAD-7 score ($P < 0.0001$) (Table 7).

We also explored that those who did not contact a positive case of COVID-19 had lower GAD-7 scores than those who did ($P < 0.0001$), also those who did not have a

TABLE 7: Comparison of demographic characteristics, COVID-19 exposure, and perception with GAD-7 scale

Variable		None	Mild	Moderate	Severe	Total	P-value
Age	18–24	53(28.3)	23(25.0)	9(17.0)	19(28.8)	103(26.1)	0.001
	25–34	73(39.7)	58(63.0)	37(69.8)	34(51.5)	202(51.1)	
	35–44	20(10.9)	10(10.9)	6(11.3)	4(6.1)	40(10.1)	
	45–54	6(3.3)	1(1.1)	1(1.9)	2(3.0)	10(2.5)	
	55–64	12(6.5)	0(0.0)	0(0.0)	4(6.1)	16(4.1)	
	65+	20(10.9)	0(0.0)	0(0.0)	3(4.5)	23(5.8)	
Occupation	Health officer	0(0.0)	0(0.0)	1(1.9)	0(0.0)	0(0.3)	0.034
	House officer	59(32.1)	25(27.2)	12(22.6)	26(39.1)	122(30.9)	
	Radiology technician	0(0.0)	0(0.0)	1(1.9)	0(0.0)	1(0.3)	
	General practitioner	43(23.4)	18(19.6)	15(28.3)	17(25.8)	93(23.5)	
	Registrar	13(7.1)	18(19.6)	11(20.8)	10(15.2)	52(13.2)	
	Specialist	14(7.6)	3(3.3)	2(3.8)	2(3.0)	21(5.3)	
	Consultant	10(5.4)	5(5.4)	0(0)	4(6.1)	19(4.8)	
	Nurse	12(6.5)	6(6.5)	2(3.8)	1(1.5)	21(5.3)	
	Lab worker	19(10.3)	10(10.9)	3(5.7)	3(4.5)	35(8.9)	
	Pharmacist	8(4.3)	4(4.3)	4(7.5)	1(1.5)	17(4.3)	
	Dentist	6(3.3)	3(3.3)	1(1.9)	2(3.0)	12(3.0)	
	Physiotherapy	0(0.0)	0(0.0)	1(1.9)	0(0.0)	1(0.3)	
	education	Diploma	2(0.5)	0(0.0)	0(0.0)	1(1.5)	
MBBS		4(2.2)	5(5.4)	3(5.7)	0(0)	12(3.0)	
Master		23(15.5)	13(14.1)	13(24.5)	9(13.6)	58(14.7)	
PHD/MD		57(31.0)	8(8.7)	2(3.8)	13(19.7)	80(20.3)	
Bachelor		98(53.3)	66(71.7)	35(66.0)	43(65.2)	242(61.3)	
Handling a positive patient	Yes	53(28.8)	11(12.0)	7(13.2)	5(7.6)	76(19.2)	< 0.0001
	No	131(71.2)	81(88.0)	46(86.8)	61(92.4)	319(80.8)	
Any friend or family member positive for COVID 19	Yes	52(28.3)	3(3.3)	5(9.4)	5(7.6)	65(16.5)	< 0.0001
	No	132(71.7)	89(96.7)	48(90.6)	61(92.4)	330(83.5)	
Fear of friends or family members of transmitting the disease	Yes	146(79.3)	81(88.0)	46(86.8)	44(66.7)	317(80.3)	0.005
	No	38(20.7)	11(12.0)	7(13.2)	22(33.3)	78(19.7)	
Increase working hours during COVID19 pandemic among participants	Yes	84(45.7)	24(26.1)	14(26.4)	17(25.8)	139(35.2)	0.001
	No	100(54.3)	68(73.9)	39(73.6)	49(74.2)	256(64.8)	
Availability of enough PPE in work place	Yes	43(23.4)	29(31.5)	9(17.0)	25(37.9)	106(26.8)	0.031
	No	141(46.6)	63(68.5)	44(83.0)	41(62.1)	289(73.2)	

friend or a family member diagnosed with COVID 19 had a lower score of GAD-7 and thus less anxiety than those who did ($P < 0.0001$). While the fear of friends and family members of transmitting the disease was found to be statistically associated with low scores ($P = 0.005$), no increase in working hours during the COVID-19 pandemic among participants ($P = 0.001$) and unavailability of enough personal protective equipment in the workplace ($P = 0.031$) were associated with low GAD-7 score (Table 7).

4. Discussion

COVID-19 pandemic crisis is probably one of the most challenging threats to national and international public health in the last few decades. The epidemic had a significant impact on healthcare communities. Initially, the HCWs were placed in a stressful condition due to the uncertainty about the mode of transmission of the disease, tremendous fear, and implementation of rigorous infection control protocols. Therefore, the purpose of this investigation was to examine the psychological impact of COVID-19 pandemic crisis on hospital health workers in Khartoum state, Sudan and to explore the relationship between personal variables and working conditions on stress responses using three validated standard scales that measure depression, anxiety, and post-traumatic stress disorder.

To the best of our knowledge, this was the first research on the mental health of Sudanese medical staffs conducted during pandemic times, where there were restrictions on most activities and significantly reduced person-to-person contact. We chose to rely on the network platform for the questionnaire survey, considering that it is difficult to directly investigate the respondents.

Regarding depression, among the participants, 82% perceived some degree of depression, with mild depression being the most common in 24.2% participants, and severe depression seen only in 15.7% of the participants; this result is consistency with another study conducted in China during the SARS outbreak, where 63.33% of the participants showed symptoms of depression with 89% of them having mild depression [31]. This finding is also similar to the result of another study conducted to measure the psychological impact and mental disturbance among medical staff in Wuhan during the COVID-19 epidemic, where most participants experienced mild disturbance, and severe disturbance was found in only about 16% [32].

Severe depression was found to be associated with those working in ER and in isolation wards; this correlates with a result obtained from a comparable study conducted in China, which showed that the healthcare providers who were caring for COVID-19 cases showed severe depression [33], this can be explained by the higher risk of infection due to the close proximity with patients.

Our study showed that 29.3% of the participants had subclinical PTSD. These results are in contrast with those of Tan *et al.*'s, which was done in Singapore on 500 health workers and which reported that only 7.7% of clinical concern of PTSD [34], whereas another study done by Lee *et al.* for health workers who worked during MERS outbreak found higher IES-R scores [35].

One interesting finding is that there is a significant association between the age and educational level of participants with IES-R score ($P < 0.0001$).

A higher IES-R score was found in people who had not dealt with infected people compared to the ones who had. Moreover, the person who did not have an infected friend or family member had a higher IES-R score.

Perhaps, the most interesting finding was that participants who did not have enough PPE in their workplace had a lower IES-R score compared to who did; this finding is at par with the findings of Wang *et al.* that reported a lower IES-R score for participants using PPE [36].

No significant difference was found between a person who had been quarantined and those who had not, which is consistent with the finding of Lee *et al.* who found no difference in IES-R scores between people who were quarantined and those who were not [35]. A possible explanation to this is that COVID-19 is a novel virus and that we have little information about it and how to handle it, and it is possible that there are immeasurable variables that could account for some aspects of the results.

GAD-7 was applied to evaluate the participant's anxiety symptoms in the last two weeks. We found that most of our participants had scored different levels of anxiety ranging from mild anxiety in 32 (23.2%), moderate anxiety in 53 (13.4%), and severe anxiety in 66 (16.7%).

When the demographic data and COVID-19 exposure and perception were compared with GAD-7 score using Chi-square (χ^2) test, the data showed that those who did not have a friend or family member diagnosed with COVID-19 had a lower score of GAD-7 and thus less anxiety than those who did ($P = 0.0001$); this finding is similar to a study done in Wuhan city, China, during this COVID-19 pandemic that found increase in anxiety among those with infected family member ($P = 0.006$) [37].

We also found that medical staff who did not deal with a positive case on COVID-19 had a lower GAD-7 score than those who did ($P = 0.0001$). During the SARS outbreak, all hospital workers are exposed to some risk of infection; however, the extent of this risk is not distributed equally. Some specialties, like ERs and critical care staff, are likely to be at higher risk than those in unrelated or non-acute specialties [38]. Our study showed that health workers who work in ER had higher GAD-7 scores than those who are working in other departments ($P = 0.034$).

Previous studies had shown that nursing staff felt more nervous and anxious when compared with other groups ($P=0.02$) (34), this is conflicting to our situation where nurses were found to be less anxious. No increase in working hours during the COVID-19 pandemic was associated with low GAD-7 score ($P = 0.001$). While other study reports that doctors were more unhappy about working overtime during the COVID-19 outbreak than other HCWs ($P = 0.02$) [9], the unavailability of enough personal protective equipment in working places was associated with a low GAD-7 score ($P = 0.031$); this contradicts another study which found that the availability of strict infection control guidelines, specialized equipment, recognition of their efforts by hospital management and the government, and reduction in reported cases of COVID-19 provided psychological benefit [39].

5. Conclusion

This study is the first to explore the impact of COVID-19 pandemic on medical staff's perception and determinants of their psychological distress during this outbreak. Most of our participants were found to be suffering from anxiety and depression with multiple independent factors. This highlights that more attention should be paid to the mental health of frontline medical personnel at the outbreak of COVID-19 in Sudan for healthcare administrators; this means that a likely strategy for appeasing the negative outcomes of stress should be addressed besides the working conditions that they face during novel times of crisis.

Future Research Directions

Researchers should conduct further studies on the long-term psychological impact of COVID-19 pandemic on healthcare providers, as also a similar study can address samples from the general population and from recovered patients who experienced the unpleasant and traumatizing experience of quarantine.

Limitations

An online questionnaire was used to collect data in this study. The Internet is a flexible and cost-effective medium for collecting data from large and specialized samples, with research-approved reliability and internal validity characteristics that are in proportion to traditional paper-and-pencil questionnaire formats [40–41]. However, it has low acceptance as a data collection tool and due to a lack of interactivity between the respondent and researcher affects the researcher's ability to authenticate an individual's responses [40]. In this study, we addressed these issues in the following ways. First, the questionnaire was posted on the personal website or social media groups of the participants, this encouraged their participation. Second, access to the questionnaire was restricted to particular professionals. Lastly, the confidentiality of the participant's responses was guaranteed on the pre-questionnaire informed consent web page. This was done to motivate the participants to respond more frankly to the questionnaire, which in turn would have increased the validity of our findings. The online questionnaire also affects the interpretation of our results because of the disproportional selection of the strata.

Another limitation of this study was our use of cross-sectional self-report data which prohibited attribution of causality. However, the inferences we have made regarding the impact of COVID-19 on healthcare providers are consistent with longitudinal data in the area. It reflects that the important associations among the variables we studied are the strong corroboration between these findings and similar relationships found in the burnout and existing SARS and COVID-19 literature. It can also affect the interpretation of our results because it cannot be used to analyze the psychological impact of the participants overtime, so that the online survey was distributed on 11th of April when there were only 19 reported cases and two deaths according to the report of the official

website of federal ministry of health on the same day [42]. The number of total cases was increased to 5499 cases on the 2nd of June, so that the results of the survey reflect the early stage of local pandemic and there might be an increase in the psychiatric burden of the pandemic. Also, it cannot be used to determine the onset of the psychological impact, whether before or after the onset of the pandemic.

Ethical Consideration

Ethical clearance was obtained from the research ethical committee (REC), Faculty of Medicine, Omdurman Islamic university. Written consent was taken from all participants through the questionnaire.

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Completing Interests

None declared.

Authors' Contribution

All authors participated in the literature search, manuscript editing, and preparation. MME and SBH were responsible for draft writing, conceiving the idea for the article, and wrote the final manuscript. AM analyzed the data of this study and participated in draft writing. All authors contributed to and approved the final report.

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