Exposure to Coronavirus Disease 2019 and Mental Health Outcomes among Healthcare Workers and The General Public

Khadeeja Munawar[1*]
Nadia Barki[2]
Farhana Madhani[3]
Fahad Riaz Choudhry[1]

[1]*Department of Psychology, Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, 47500 Subang Jaya, Selangor, Malaysia*

[2] *National Institute of Psychology, Quaid-i-Azam University, Islamabad, Pakistan*

[3]*Faculty of Applied Health Sciences Brock University, Ontario, Canada*

[1]Corresponding e-mail: [khadeeja.munawar14@gmail.com]

Evidence-based investigations targeting a wide array of healthcare workers (HCWs) and the general public are limited in Pakistan. This cross-sectional study was conducted amidst strict lockdown, hence; data were collected through a web-based questionnaire. Using snowball survey technique, total of 230 (n = 132 general public, n = 98 frontline or second-line HCWs) participants from all over the country were recruited. Most participants fell in the 26-35 years of age category and 64.3% of the participants were women. Results showed that the severe psychological distress category was rated as the second most frequent category after the "normal" category. The frontline HCWs reported severe symptoms of distress as compared to the second-line HCWs. Interestingly, most of the participants reported minimal depressive symptoms, however, as compared to HCWs, the general public reported severe depressive symptoms. Regarding the centrality of COVID-19-related events, the general public reported these events to be referential and influential in their lives. This paper is unique as it shows that amidst the COVID-19 pandemic, HCWs and the general public experienced mental health problems and had several risk factors that increased their vulnerability to developing mental health issues.

Keywords: coronavirus, health workers, mental health, traumatic events, central events

With the dawn of 2020, a new challenge emerged for the humanity in the form of the coronavirus disease 2019 (COVID-19). The first outbreak of COVID-19 was registered in the Wuhan city of China and soon acquired the status of a global health threat (Liu et al., 2020; Wang et al., 2020a) and pandemic. After the severe acute respiratory syndrome (SARS) epidemic of 2003, COVID-19 is presumed to be the second major epidemic of atypical pneumonia (Wang et al., 2020b). However, unlike SARS, the overall incidences and mortality due to COVID-19 were not limited to initial outbreak (Hawryluck et al., 2004; Rajkumar, 2020) as the mortality rate continues to grow months after the first outbreak. COVID-19 was primarily identified at the end of 2019 after incidences of various pneumonia-like

symptoms of unknown aetiology were associated with a seafood market and untraced contacts in the city of Wuhan of Hubei Province (Nishiura et al., 2020). Ultimately, in the beginning of 2020, the incidences and mortality worsened, and the virus spread throughout China. Owing to its impact, World Health Organization (WHO) proclaimed it a public health emergency of worldwide concern (Mahase, 2020).

In Pakistan, on February 26, 2020, the first case of COVID-19 was reported in Karachi (Abid et al., 2020). According to the Ministry of National Health Services Regulations & Coordination Department of Government of Pakistan (GoP), the virus steadily spread to other regions of the country and the confirmed cases due to COVID-19 rose to 56,386 within a few days. However, according to the GoP statistics, in 2020, 19,142 individuals recovered and there were 1,225 deaths due to the virus (2020).

Since its outbreak, researchers have sought to understand the various facets of COVID-19. For instance, studies have assessed epidemiology and clinical attributes of contaminated patients (Chen et al., 2020; Huange et al., 2020), the genomic aspects of the virus (Lu et al., 2020), and matters of global health governance (Rubin & Wessely, 2020). Additionally, several studies have investigated the psychological impact of COVID-19 (Satici et al., 2021; Wang et al., 2020b). These kinds of empirical investigations are pertinent during the uncertainty encircling a pandemic of such an unparalleled magnitude. Considering the importance of the impact of COVID-19 on mental health, it is essential to investigate its impact on mental health across various regions. Additionally, the representation of Pakistan region is exceptionally low in pandemic related research and no study could be located that compared the impact of the pandemic on mental health across the general public, front line workers, and second line workers.

With respect to the psychological impact of COVID-19, Wang et al. (2020) assessed psychological responses and related factors during the preliminary stage of COVID-19 among the general public. Their findings showed moderate to severe psychological impact and moderate to severe symptoms of depression, stress, and anxiety (Wang et al., 2020b). According to these researchers, the presence of updated information related to this virus and specific precautionary actions reduced psychological influences of the outbreak, levels of stress, anxiety, as well as depression.

During these trying times of COVID-19, most of the health authorities and media are focusing on biological and physical consequences; mental health issues are not of primary concern. Nonetheless, the need of enhanced mental health services has intensified owing to the growing mental health burden of the pandemic. For instance, on 27th January 2020, the National Health Commission of the People's Republic of China issued detailed guidelines for emergency psychological calamity intervention for the affectees of COVID-19 (2020). In these guidelines, the need to offer mental health services to patients and Health Care Workers (HCW) through multi-disciplinary mental health teams was emphasized.

According to Patel and Jernigan (2020), the need of the hour is to prepare the health care systems and the general public to be medically and psychologically resilient (Patel & Jernigan, 2020). Literature has demonstrated that both frontline and second-line health care workers, who were highly susceptible to exposure of infectious disease outbreak displayed high stress, were emotionally impacted, distressed, and had elevated symptoms of depression and anxiety (McAlonan et al., 2007). The authors further elaborated that these findings were expected due to the positive relationship between psychological health and the risk of exposure. Furthermore, according to the authors, a fear of

transferring infection to significant others may also be present in these participants.

Similar studies demonstrated worsened psychological reactions to the SARS pandemic among HCWs (18-20). Studies also showed that HCWs experienced uncertainty and stigmatization (Bai, et al., 2004; Maunder et al., 2003; Tiong & Koh, 2013), stated unwillingness to work or were considering to quit (Bai, et al., 2004), showed elevated levels of stress, anxiety, and symptoms of depression which could carry serious long-term repercussions for their mental health (Lee et al., 2007; Naushad et al., 2019). Furthermore, doctors and single HCWs were more susceptible to mental health issues as compared to married HCWs (Chan & Huak, 2004). A recent systematic review on the effects of a catastrophe on mental health of HCWs revealed unhealthy coping and lack of social support, communication and training as frequent risk factors of developing mental health issues (Naushad et al., 2019).

Nevertheless, the impact of traumatic events such as COVID-19 depends upon how central such events are in a person's life. Studies on psychological wellbeing revealed that traumatic/negative events were usually highly accessible and individuals experiencing traumatic events overestimated the overall occurrence of such incidents as well as the possibility of re-traumatized in the future (Berntsen & Rubin, 2006). Salience or centrality of traumatic events in life means that the trauma is considered a representative of the individual's self and/or as a symbol for enduring themes in the person's life story.

The isolation strategy of social/physical distancing implemented worldwide to limit the transmission of COVID-19 may be exacerbating stress and causing mental health issues (Rhodes et al., 2001). Past studies have linked negative appraisals of a catastrophe with mental health issues during the outbreak of SARS and Ebola (Cheng et al., 2006; Dorfan & Woody, 2011; Vartti et al., 2009; Yang & Chu, 2018).

The above studies show that people differ with regards to the degree to which a traumatic event impacts their comprehension of the world, appraisal of the negative events, the extent of centrality of traumatic event in their lives and their mental health issues. Additionally, COVID-19 pandemic has critically influenced the physical and mental health, as well as lives of masses. It has resulted in various mental health issues such as panic disorder, anxiety, and depression. Nonetheless, evidence-based investigations targeting and comparing wide array of HCWs and general public are comparatively limited. To the authors' knowledge, no studies have empirically compared the psychological effects and mental health outcomes of COVID-19 on HCWs and the general public in Pakistan- a country with steadily rising confirmed cases and deaths (World Health Organization, 2020), and poorly-equipped HCWs to deal with COVID-19 (Stratford, 2020).

Thus, this study aimed at ascertaining the mental health influences of COVID-19 and its impact on lives of HCWs and general public in Pakistan. It was anticipated that the extent to which a traumatic or stressful event occupied a salient position in life of a person influenced association with mental health issues. The findings of this study will subsequently, provide empirical grounds for adapting and implementing adequate mental health intervention policies to deal with this challenge effectively. It will also reveal the section of the society most susceptible to poor mental health outcomes during the pandemic and where the designed mental health interventions should be targeted on priority basis. This study may assist the government bodies and healthcare professionals in sustaining the psychological wellbeing of the people in the face of COVID-19 outbreak in Pakistan and in various parts of the world in general.

Method

Setting and Participants

This is a cross-sectional study performed via an online survey run from April 9th to May 17th 2020. The survey was conducted when the outbreak in Pakistan was peaking and by the end of the survey Pakistan had total confirmed cases at 39,000 (Office for the Coordination of Humanitarian Affairs, 2020). This study was designed to be web-based as it was conducted amidst strict lockdown due to COVID-19. A snowball sampling strategy aimed at recruiting the HCWs and general public living in Pakistan during the epidemic of COVID-19 was utilized. The online survey was initially disseminated through social media especially Facebook and WhatsApp. Participants from the general public, front line workers and second line workers were targeted in the study. The aim was to obtain a comparison of the impact of COVID-19 on mental health across various sections of the society. Pakistan was under strict lockdown during the study and it was intriguing to compare the level of depressive symptoms where one section of the sample was exposed to COVID-19 and was braving the pandemic as front-line workers, while general public was least exposed and forced to stay at home during the pandemic.

Procedure

As the GoP recommended the public to minimize face-to-face/physical interaction and isolate themselves at home, potential respondents were electronically invited by sharing the link to survey on various social media platforms. All participants who responded were familiar with the English language hence no translated scales were used. Expedited ethics approval was obtained from the Research, Seminar and Publication Committee, Department of Psychology, International Islamic University Malaysia (IIUM), which conformed to the principles embodied in the Declaration of Helsinki. Additionally, written informed consent was obtained from all participants included in the study by including a formal consent letter before the set of questionnaires. Participants agreeing to participate in this study had to sign the letter. Also, formal approval was sought from the respective authors of the tools for data collection. The survey was open to participants across the country. As part of the inclusion criteria, participants from at least 15 years old were welcomed to fill the online questionnaire. The online questionnaire included several demographic variables at the start of the survey (age, gender, area of living, working position, etc). All questions were mandatory to be filled or the participant was presented with the warning of incomplete questionnaire. After reading a brief explanatory statement, each participant would fill the consent form and begin the survey.

Instruments

A measure of demographic information

Demographic information was collected on the basis of simple questions in the online survey. The demographic information included age (age in years), working position (frontline, second line, general public), medical/non-medical worker, current occupation (to confirm nature of work), gender (male, female, prefer not to say, other), marital status (single, divorced/separated, married, widowed), status of living with family (yes/no), and living area (urban/rural). In the working position demographic, those who were directly involved in the treatment or management of COVID-19 patients or its related events were defined as frontline workers; those who were in the setting

where COVID-19 patients were being treated but were not directly involved were second-line workers, and the rest were considered general public.

A measure of depressive symptoms

Depressive symptoms were assessed through Patient Health Questionnaire which has 9 items (PHQ-9) assessing the severity of depressive symptoms from minimal to severe symptoms (Kroenke et al., 2001). PHQ-9 is "a dual-purpose instrument that with the same nine items, can establish provisional depressive disorder diagnoses as well as grade depressive symptom severity" (Kroenke & Spitzer, 2002). PHQ-9 has become progressively famous in research and practice over the past decades (Kroenke et al., 2010). In its preliminary validation study, a score of 10 or higher had a sensitivity of 88% and a specificity of 88% for detecting major depressive disorders. Thus, a score of 10 has been suggested as the cut-off score for diagnosing this condition (Kroenke et al., 2001). PHQ-9 has also been extensively employed in research in Pakistan. Sikanderet al. (2019) used PHQ-9 in their study to investigate depressive symptoms among pregnant women; the Urdu version of PHQ-9 was used in the said study as the participants were from rural areas only (Sikander et al., 2019). Similarly, Mahmood et al. (2017) have used PHQ-9 to investigate prevalence of depression among individuals with hypertension in a tertiary care in Karachi, Pakistan. The questionnaire in the study in question was not self-administered and data was obtained through interview and a translated version of PHQ-9 was used (Mahmood et al., 2017). Altaf et al. (2015) used the English version of PHQ-9 to investigate the sociodemographic depression pattern in urban Karachi.

As a severity measure, the PHQ-9 score can range from 0 to 27, since each of the 9 items can be scored from 0 (not at all) to 3 (nearly every day). A score of 1 to 4 indicates minimal depression, 5 to 9 is mild depression, 10 to 14 is moderate depression, 15 to 19 is moderately severe depression, and 20 to 27 is severe depression.

A measure of centrality of events

Centrality of COVID-19 and its related events was assessed through Centrality of Event Scale which has 7 items (CES-7). It is the shorter version of the original CES developed by Berntsen and Rubin, 2006. The response score ranges from 1 to 7 with response options ranging from totally disagree to totally agree (Berntsen & Rubin, 2006). The authors of the current study were unable to find any published online available research studies that might have used the Centrality of Event Scale in Pakistan.

A measure of psychological impact

The psychological impact of COVID-19 and its related events was assessed through Impact of Event Scale- Revised with 22 items (IES-R) (Creamer et al., 2003). It is a self-administered scale to ascertain the extent of psychological impact after exposure to a public health crisis within one week of exposure. There are three subscales of this questionnaire which measure the mean avoidance, intrusion, and hyperarousal. The scores ranged from 0 to 88 and divided into 0–23 (normal), 24–32 (mild psychological impact), 33–36 (moderate psychological impact), and >37 (severe psychological impact) (Creamer et al., 2003). The IES-R has been used extensively in studies in the Pakistani context (Kerai et al., 2017; Ehring et al., 2011).

All the scales had good to excellent Cronbach's α coefficients (Boyacıoğlu, & Aktaş, 2018; Malinauskienė, & Bernotaitė, 2016; Sun et al., 2022). None of the scales listed above were translated for the purpose of this study. English was the language of

the survey as it is easily understandable for Pakistanis due to English language's status in the country; 49% of Pakistani population can speak English ("English-more than a subject", 2014). Therefore, the scales were neither translated nor any translated version was used.

Results

Statistical analyses were conducted through SPSS v25 for Windows 10. Descriptive statistics were computed to check frequencies across demographics. The data was checked for normalcy through skewness and kurtosis. Cronbach's alpha reliability of the scales was computed on the Pakistani population which showed that the scales were highly reliable at α>0.80 (Cronbach, 1951; Tavakol & Dennick, 2011). Cross-tabulation was done to check response option frequencies with percentages. Mean differences across demographics were computed through *t-test* and ANOVA which resulted in mean differences in age and status of living with family across PHQ-9 and working position across CES-7. Pearson moment product correlation coefficient was computed for all main study variables. The bivariate correlation analysis showed that the study variables were correlated significantly at p<0.01. Stepwise regression analysis was conducted to explore significant predictors of depression symptoms. Majority of expected predictors contributed non-significantly to the model; only 3 variables CES, age, and status of living with family significantly predicted depression symptoms at *p*<0.05 with model 3 explaining 15% variance in depression symptoms.

    In the current study, out of 250 people that were contacted, a total of 230 consented to participate in the web-based study (i.e. 20 people declined), thus, the response rate was 92%. Among the total respondents, *n*=132(57.4%) reported their position as general public (i.e. who were not involved directly in response against

COVID-19 services); *n*=52(22.6%) reported as frontline workers which included doctors, psychologists, ambulance drivers, other hospital staff and members of administration. However, a total of n=46 (20%) were second-line workers including teachers as volunteers, and members of administration. Additionally, the sample size of 170 was calculated using the G*Power software to achieve 80% power with a medium effect size (R^2= .13) at .05 level of significance (Faul et al., 2009). Majority of the respondents were women *n*=148(64.3%) and fell in the 26-35 years of age category [*n*=132(57.4)]. In the educational attainment characteristic, majority of respondents had 16 years and above of education [*n*=192(83%)]; majority of the respondents lived in urban areas with their families (Table 1).

Table 1
Sociodemographic Characteristics of Responders (N=230)

	n(%)
Gender	
Male	81(35.2)
Female	148(64.3)
Prefer not to say	1(.4)
Marital Status	
Divorced/separated	3(1.3)
Married	71(30.9)
Single	156(67.8)
Age in Years	
15-25 years	82(35.7)
26-35 years	132(57.4)
36-45 years	12(5.2)
46 and higher	4(1.7)
Educational Attainment	
12 years of education	13(5.7)
14 years of education	26(11.3)
16 and above years of education	191(83)
Working Position	
General Public	132(57.4)
Front-line worker	52(22.6)
Second-line worker	46(20.0)
Living Area	
Urban	191(83.0)
Rural	39(17.0)
Living with Family?	
Yes	206(89.6)
No	24(10.4)

Before computing results, the data was checked for normalcy through skewness and kurtosis. George and Mallery (2010) have defined values between -2 and +2 for asymmetry that can be considered acceptable for normal distribution (George,

2011). Based on these values, the data was found to be normally distributed. The study measures were found to be highly reliable for Pakistani respondents at .83 for CES, .91 for IES-R, and .87 for PHQ-9 (Table 2).

Table 2
Means, Standard Deviations, Cronbach's Alpha, and Skewness and Kurtosis of Study Measures

Measures	M	SD	K_u	S_k
Centrality of Event Scale (CES)	21.72	6.78	-.70	-.31
Impact of Event Scale-R (IES-R)	28.86	17.07	-.77	.37
Patient Health Questionnaire-9 (PHQ-9)	6.62	6.09	.522	.98

Distress of COVID-19 and related events was measured through two scales: IES-R and PHQ-9. A great majority of participants on the 'working position' demographic fell in the 'normal' (44.8%) category followed by 'severe distress or severe psychological impact' (33.5%). Among men, 34.6% reported severe distress as compared to 32.4% women; a single response was received from 'unspecified gender' and it reported severe distress (100%). In the age characteristic, majority of respondents fell in the 'normal' category. Overall, across all demographics, the highest level of distress was 'normal' closely followed by 'severe' symptoms of distress. Compared to second-line workers, front-line workers reported elevated/higher symptoms of distress. Among medical and non-medical workers, comparatively non-medical workers scored higher scores on IES-R categories of 'moderate' and 'severe' symptoms (i.e., 37%) . The highest percentage from each group was for 'normal' category followed by 'severe' symptoms for both medical (24.6%) and non-medical (37.3%) groups. Participants who were not living with their families reported higher percentage (50%) for severe symptoms. Similarly, participants from rural areas had higher percentage (51.3) for 'severe symptoms'. No significant mean differences were found across all demographics on the IES-R

scores. Overall, divorced male participants from general public, aged between 15-25 years, living away from family in rural areas had higher precedence of 'severe symptoms' of distress as compared to other groups. Table 3 shows details about sociodemographic-wise symptoms.

On the PHQ-9, majority of respondents (32.2%) reported minimal depressive symptoms. A total of 2.6% responders reported severe depressive symptoms. Male responders reported more severity in their symptoms (3.7%). Similarly, general public responders reported higher percentages across the depression symptoms severity index as compared to frontline and second-line workers. A total of 14.1% and 15.4% married and single respondents reported no symptoms closely followed by the percentages of minimal, mild, and moderate depressive symptoms, respectively. When compared to female respondents, male participants reported severe depressive symptoms. Across demographics, age ($p<0.05$) and whether the respondent was living with family or not ($p<0.01$) had significant mean difference across categories (as shown in Table 3)

To measure the centrality of COVID-19 and related events, CES-7 was used and mean scores were calculated across demographics. Comparing the means across groups, general public [$M=22.2$] reported highest centrality of the memory of COVID-19 and its related events as reference point among demographics. There was also significant mean difference computed across the working position demographic ($p<0.05$). Female and male participants reported very minute difference in the centrality of COVID-19 and its related events [M=21.8; SD = 21.4] to their personal identity and its attribution to other experiences in life. Similarly, non-medical and medical workers reported slight mean difference for CES [$M=21.7$; SD = 21.6]. Additionally, participants who were divorced, living in rural areas without

their families and were over 45 years of age reported higher centrality of COVID-19 and its related events (see Table 3).

The scores on all measures were found to be significantly positively related. Pearson product-moment correlation coefficient was computed for PHQ-9, CES, and IES-R. Table 4 displays the means, standard deviations, and score correlations of all three measures. CES scores were found to be significantly positively correlated with PHQ-9 scores ($r=.29$, $p<0.01$) and IES-R scores ($r=.48$, $p<0.01$). Similarly, PHQ-9 scores were significantly positively correlated with IES-R scores ($r=.29$, $p<0.01$) and IES-R ($r=.48$, $p<0.01$). Similarly, PHQ-9 was significantly positively correlated with IES-R ($r=.60$, $p<0.01$). Increase in the score on one measure was positively correlated with significant increase in score on other measures used in this study (see Table 4).

Table 4
Summary of Pearson Correlation, Means, and Standard Deviations for the Total Scores on CES, PHQ-9, and IES-R

Measures	M	SD	1	2	3
1. CES	21.72	6.78	---		
2. PHQ-9	6.62	6.09	.29**	---	
3. IES-R	28.86	17.07	.48**	.60**	---

Linear regression analysis using stepwise method was computed to explore the prediction of depression symptoms across all demographic variables and scores on centrality of COVID-19 and its related events. Using stepwise regression, all predictors were excluded due to lack of a significant contribution to the model except scores on CES, age in years, and status of living with family. In Model 1, only CES scores were included to predict severity of depression symptoms; CES scores

significantly predicted the severity of the depression symptoms with variance in depression symptoms explained at 8%. In Model 2, age in years along with CES significantly predicted depression symptoms and a model change of .03 was noticed and total variance explained increased to 12%. In final Model 3, status of living with family was added to increase the R^2 from .12 to .15 with total variance explained totalling 15% at $p<0.01$ [F change (3, 226)]. Among all the significant predictors, age in years was a significantly negative predictor of depression symptoms which means that participants in lower age categories scored higher on the depression symptoms (PHQ-9); with an increase in age, the depression symptoms scores were predicted to decrease (see Table 5).

Table 5
Stepwise Regression Analysis of Predictors associated with Depressive Symptoms (PHQ-9) at $p\leq0.05$.

Step	Predictors	PHQ-9 as dependent variable					
	Stepwise model included predictors	B	β	t	p-value	R^2	R^2 change
	Model 1						
1	Total score on CES	0.26	.29	4.68	0.00	.08	.08
	Model 2						
1	Total score on CES	0.26	.29	4.68	0.00	.12	.03
2	Age in years	-1.85	-.19	-3.12	0.00		
	Model 3						
1	Total score on CES	.27	.30	4.91	0.00		
2	Age in years	-1.94	-.20	-3.32	0.00	.15	.03
3	Living with family?	3.52	.17	2.89	0.00		

Excluded variables: gender; marital status; working position; Living area; medical/non-medical worker

Table 3
Mean Differences of Distress and Depressive Symptoms Severity across Demographics (N=230)

Severity Measures	Total n(%)	Working Position			Gender			Age(in years)				Marital status			Living with family?		Area		M/ NMW	
		General public	Front line worker	Second line worker	Male	Female	Prefer not to say	15-25	26-35	36-45	>45	Divorced/separated	Married	Single	Yes	No	Rural	Urban	MW	NMW
	n(%)	n(%)			n(%)			n(%)				n(%)			n(%)		n(%)			
IES-R, Distress		p>0.05			p>0.05			p>0.05				p>0.05			p>0.05		p>0.05		p>0.05	
Normal	103(44.8)	51(38.6)	25(48.1)	7(58.7)	35(43.2)	68(45.9)	0	30(36.6)	63(47.7)	8(66.7)	2(50)	1(33.3)	33(46.5)	69(44.2)	94(45.6)	9(37.5)	15(38.5)	88(46.1)	38(55.1)	65(40.4)
Mild	35(15.2)	21(15.9)	7(13.5)	7(15.2)	11(13.6)	24(16.2)	0	15(18.3)	18(13.6)	0	2(50)	0	13(18.3)	22(44.2)	34(16.5)	1(4.2)	3(7.7)	32(16.8)	11(15.9)	24(14.9)
Moderate	15(6.5)	12(9.1)	2(3.8)	1(2.2)	7(8.6)	8(5.4)	0	7(8.5)	8(6.1)	0	0	0	5(7)	10(6.4)	13(6.3)	2(8.3)	1(2.6)	14(7.3)	3(4.3)	12(7.5)
Severe	77(33.5)	48(36.4)	18(34.6)	11(23.9)	28(34.6)	48(32.4)	1(100)	30(36.6)	43(32.6)	4(33.3)	0	2(66.7)	20(28.2)	55(35.3)	65(31.6)	12(50)	20(51.3)	57(29.8)	17(24.6)	60(37.3)
PHQ-9, Depression		p>0.05			p>0.05			p<0,05				p>0.05			p<0.01		p>0.05		p>0.05	
No symptoms	34(14.8)	18(13.6)	6(11.5)	10(21.7)	16(19.8)	18(12.2)	0	6(7.3)	24(18.2)	2(16.7)	2(50)	0	10(14.1)	24(15.4)	31(15)	3(12.5)	7(17.9)	27(14.1)	16(23.2)	18(11.2)
Minimal	74(32.2)	33(25)	23(44.2)	18(39.1)	26(32.1)	48(32.3)	0	20(24.4)	48(36.4)	5(41.7)	1(25)	0	28(39.4)	46(29.5)	66(32)	8(33.3)	13(33.3)	61(31.9)	21(30.4)	53(32.9)

Mild	55(14.8)	39(29.5)	10(19.2)	6(13)	14(17.3)	40(27)	1(100)	25(30.5)	26(19.7)	3(25)	1(25)	2(66.7)	20(28.2)	33(21.2)	54(26.2)	1(4.2)	6(15.4)	49(25.7)	17(24.6)	38(23.6)
Moderate	38(16.5)	23(17.4)	7(13.5)	8(17.4)	15(18.5)	23(15.5)	0	19(23.2)	17(12.9)	2(16.7)	0	1(33.3)	8(11.3)	29(18.6)	31(15)	7(29.2)	9(23.1)	29(15.2)	7(10.1)	31(19.3)
Moderately severe	23(10)	14(10.6)	5(8.6)	4(8.7)	7(8.6)	16(10.8)	0	9(11)	14(10.6)	0	0	0	4(5.6)	19(12.2)	21(10.2)	2(8.3)	4(10.3)	19(9.9)	7(10.1)	16(9.9)
Severe	6(2.6)	5(3.8)	1(1.9)	0	3(3.7)	3(2.0)	0	3(3.7)	3(2.3)	0	0	0	1(1.4)	5(3.2)	3(1.5)	3(12.5)	0	6(3.1)	1(1.4)	5(3.1)

%= column-wise percentage; IES-R = Impact of Event Scale- Revised; PHQ = Patient Health Questionnaire, MW = Medical workers; NMW = Non-medical workers

Discussion

This study was conducted to assess the mental health influences and impact of COVID-19 on the lives of HCWs and the general public. The dependent variables were: depressive symptoms, psychological impact of COVID-19 and its related events, and Centrality of COVID-19 and its related events. The findings of this study indicated that overall, severe psychological distress category (i.e., a score of >37) was rated as the second most frequent category after normal category. Severe levels of psychological distress (in terms of higher depressive symptoms) were reported by male participants as compared to female participants. Regarding its relationship to the general public having greater depressive symptoms than the HCWs, these findings are in line with a study conducted by Wang et al. (2020). The authors also showed that being male (of any working group) was significantly associated with higher scores in the stress, anxiety and depression subscale of the Depression, Anxiety and Stress Scale — a measure of mental health status (Le et al., 2019). Furthermore, frontline HCWs reported severe depressive symptoms of distress as compared to second line HCWs. This finding resonates with an earlier study conducted to explore the medical health workers' psychosocial problems during COVID-19 outbreak by Zhang et al. (2020). Zhang et al. (2020) used PHQ-9 and their findings also revealed elevated depressive scores of medical health workers on the questionnaire. Interestingly, in the present study, most of the participants reported minimal depressive symptoms (i.e., a score of 1–4); however, as compared to HCWs, general public reported severe (i.e., more) depressive symptoms (i.e., a score of 20–27). Pappa, Ntella, Giannakas et al (2020) reported comparable levels of depression between HCWs and general public ranging from 22.8% for the former and up to 48.3% for the latter. Although, a difference in prevalence of severity of depressive symptoms between front line workers and the general public can be noticed in the present study, it can be justified for the general public through disturbance of routine life and a state of uncertainty due to COVID-19. For front line workers in Pakistan, the severity of the pandemic was not on par with the rest of the world which might have impacted the prevalence of the symptoms. Similar to findings of Chew et al. (2020), severity of psychological distress was higher among non-medical professionals compared to medical professionals. Since COVID-19 is a novel phenomenon and information about it is constantly being updated by health organizations, the fears associated with transmission and exposure may contribute to severity of psychological distress. For non-medical professionals, it can be sometimes difficult to tell the myths and facts of COVID-19 pandemic apart which can further exacerbate distress associated with the pandemic.

Similar to scores on IES-R, males received severe scores, ranging between 20 to 27, on PHQ-9. In line with the present study, Lai et al. (2020) also investigated the magnitude of mental health outcomes and associated factors among health care workers treating patients exposed to COVID-19 in China. Along with other assessment measure, the authors used PHQ-9 and IES-R, and showed that frontline health care workers reported severe (i.e., more) degrees of all measurements of mental health symptoms than other health care workers. Frontline health care workers who engaged in direct diagnosis, treatment, and care of patients with COVID-19 were associated with a higher risk of symptoms of depression, insomnia, and distress. Regarding centrality of COVID-19 related events, general public reported these events to be referential and influential in their lives.

Additionally, higher psychological distress (i.e., a score of >37), severity of depressive symptoms (i.e., scores ranging from 20 to 27), and higher centrality of

COVID-19 and its related events were found among individuals not living with their families, in rural areas, aged above 45 years, and divorced. Zhang et al. (2020) also showed that living in rural areas was a risk factor for mental health issues.

Similar to our findings, a past study conducted during SARS outbreak also reported adverse psychological symptoms among most of the HCWs (Chua et al., 2004). However, the psychological reaction of HCWs to such an epidemic is complicated and multi-faceted. Distress may occur due to feelings of susceptibility or due to feeling of lack of control over things happening around someone, worries about own as well as significant other's health and safety, variations in work schedules or routines, and isolation (National Health Commission of the People's Republic of China, 2020). This way, perceived danger may be exaggerated due to the contagious nature of COVID-19 (i.e., human-to-human transmissible) and its link to higher rates of morbidity and mortality (Li et al., 2020; Rothe et al., 2020; W.Wang et al., 2020). Furthermore, due pressure and worries of HCWs may be intensifying because of a decline in supplies and a higher arrival of possible cases of COVID-19 (Chan-Yeung, 2004).

HCWs are particularly vulnerable in a pandemic. Similar to the findings of the current study, previous literature has paid special attention to the mental health of HCWs. Liang et al. (2020) reported through cross-sectional study the high impact of COVID-19 on the mental health of HCWs with depressive symptoms that (Liang et al., 2020). On a similar note, Lai et al. (2020) noted a 50.4% incidence of depressive symptoms among frontline health workers. However, in this study, frontline workers were found to be less affected by COVID-19 than the general public (Lai et al., 2020). This can be explained through the intensity of the pandemic in Pakistan which was less severe than the rest of the world. Hence, owning to

lesser severity of the COVID-related-events, lesser depressive symptoms were noted.

Past studies have shown that frontline HCWs dealing with COVID-19 patients experienced more distress due to direct exposure to the viral infection, recurrent and frequent contact with patients and arduous working hours than routine (Li et al., 2003; Shih et al., 2007; Wong et al., 2005; Zhang et al., 2014). This is especially true for the current study as well because even though general public had more severe depressive symptoms, front line workers had more severe depressive symptoms than second line workers. As a result of these psychological responses, specific attention is necessary concerning the mental health well-being of frontline HCWs treating patients with COVID-19. As suggested by Berntsen et al. (2003), the events related to COVID-19 occupied a central position in participants' lives which impacted their mental health.

Regarding the aftermath of the COVID-19, these findings will offer important guidance for designing psychological support programmes and areas to focus on in Pakistan as well as other places and populations gravely impacted by the pandemic. Therefore, the need of the hour is to equip the healthcare workers and the general public both medically as well as psychologically. Our findings also have clinical and policy implications. Based upon the sociodemographic characteristics, the health authorities should recognize high-risk groups and provide immediate psychological services. Another recommendation is to launch e-mental health services comprising online or smartphone-based psychoeducation and psychological techniques (e.g., cognitive-behavior therapy, psychological first aid, prevention of violence and substance abuse, etc) to minimize risk of virus transmission by face-to-face therapy. Such platforms may also serve as a support group for

people who are spending majority of their time confined in their homes.

Limitations

This study has several limitations. The data was collected when the pandemic was ongoing and researchers were conscious of social/physical distancing enforced by the government, hence, data was collected through online surveys circulated via social media. Therefore, findings may not be generalized to individuals not using social media. It is also not possible to ascertain the participation rate as it is undecided how many individuals received the link for the survey. The data was collected during the initial weeks of lockdown due to COVID-19, hence, long-term mental health implications during the increasingly arduous situation of the pandemic could not be ascertained. This study was not based on participants who had recovered, were confirmed, or suspected cases, therefore, future studies may be focused on these individuals. Also, it would be ideal to perform a prospective study on the same group of participants as in our study, after a certain time-period, to offer a definite finding to support the need for a focused public health initiative.

Additionally, due to restricted availability of resources and time-sensitive nature of the COVID-19 outbreak, snowball sampling strategy was adopted. Therefore, the sample was not selected through random sampling, and the participants did not indicate the true pattern of the general population. This study did not differentiate the impact and role of COVID-19 on people in worst-hit areas versus low-hit areas. This study did not differentiate previous mental health symptoms versus new symptoms. The data was collected from participants who could read and understand English and as a result, the conclusion is less generalizable to the entire population, particularly people who cannot understand English. The self-reported measures of psychological impact may not be an alternative to assessment by mental health professionals. The use of clinical interviews is suggested in future studies to draw a more thorough assessment of the problem. The COVID-19 related events did not necessarily satisfy the diagnostic criteria of a traumatic event according to American Psychiatric Association (American Psychiatric Association, 2013). Hence, to clarify whether individuals experienced events that fulfilled criteria of trauma according to APA (2013), future studies should collect data using standardized trauma checklists. Last, the study specifically focused on the impact of COVID-19 on mental health and did not record any protective factors. As a future direction, studies should focus on protective factors along with impact of an event on mental health to broaden the scope and implication of the research.

Conclusion

Despite the above limitations, this study offers vital information on the initial psychological reactions a few weeks after the outbreak of COVID-19 from participants all over the country. These findings may be utilized as a historical reference. Most prominently, the findings support the designing of mental health interventions that can lessen psychological impact and mental health issues during the epidemic of COVID-19. The findings offer a baseline for assessing deterrence, control, and management strategy efforts all over the remainder of the COVID-19 pandemic, which is still ongoing in Pakistan at the time of submitting this manuscript. The findings of this study may also be used to assess the factors of resilience among Pakistani population especially front line and second line workers.

Ethics approval: Ethics clearance was obtained from the Research, Seminar and Publication Committee, Department of Psychology, International Islamic University Malaysia (IIUM). The study also followed the Ethical Standards of the 1964 Helsinki Declaration and its Later Amendments or Comparable Ethical

Standards. Written informed consent was obtained from all participants included in the study by requesting them to include their e-signatures before beginning the survey to show their consent. Also, formal approval was taken from the respective authors of the tools for data collection.

Intellectual property: Permission has been received to use any material in the manuscript such as figures etc. which isn't original content.

Authorship: All authors (i.e., KM, NB, FM and FRC) have contributed equally to this work. KM and FRC conceived the idea of this paper, supervised the entire process, and added important intellectual content. FM, KM and NB contributed substantially to the manuscript write-up. FRC, FM and NB reviewed and provided feedback for improvements. All authors have also agreed to be accountable for all aspects of this manuscript in ensuring that questions related to the accuracy or integrity of any part of this manuscript are appropriately investigated and resolved.

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