Stress and Coping Strategies of Health Care Workers During Covid-19 Pandemic

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ABSTRACT

Background: Since the onset of the current epidemic of COVID-19 infection among humans in Wuhan, China and it's spreading around the globe causing heavy impacts on physical and mental health, especially health care workers.
Objective: To estimate the prevalence of stress among health care workers and their coping strategies during COVID-19 pandemic. **Patients and Methods:** A descriptive, observational, cross-sectional study was conducted from July 1st to August 30th, 2021. It included health care workers within Mansoura city dealing with confirmed or suspected cases of COVID-19. An online self-administered questionnaire; 17 questions, Perceived Stress Scale (PSS-14) and Mini-COPE Inventory (COPE-28). **Results:** A total of 227 health care workers responded the questionnaire with mean stress score of 27.77±4.76SD. Prevalence of severe stress was 21.1% that appeared more among divorced or widow health care workers (OR=4.75), working directly with COVID-19 patients, in primary health units, not satisfied with their income with present history of comorbidity or psychiatric disease (OR=2.13, OR=5.9) and with minimal sleeping duration. There was statistically significant positive correlation between total stress score and each strategy of adaptive and maladaptive coping strategies.
Conclusion: High job demands, increased work responsibilities, fear from infection transmission and many other stressors have put health care workers under unusual level of stress during COVID-19 pandemic.
Keywords: Job Stress; Coping Strategies; Health care workers; COVID-19.

INTRODUCTION

Since the coronavirus disease 2019 (COVID-19) epidemic in China, the population has battled it with resources. Health care workers (HCWs) are essential assets in this fight, in addition to the efforts they make at every level. Researchers started to worry about their mental health and how much they were able to cope with all of this after acknowledging their work in the COVID era's fight against dynamic elements. It is crucial to safeguard HCWs against the harmful psychological consequences of the pandemic [1]. People all across the world are affected by the COVID-19 pandemic in terms of their social interactions and mental health. Global traumatic stress has resulted from the virus's rapid spread due to globalization and human mobility [2]. The pandemic's sense of instability and uncertainty, the necessity to alter our plans, the possibility of losing our jobs, financial instability, and social isolation have all contributed to a sensation that we are losing control of our lives [3,4].

The most frequent group that reacted to the COVID-19 crisis forcefully was the medical community [5]. Even though the pandemic has largely faded and restrictions have been relaxed in many areas, working in pandemic conditions has been particularly difficult for physicians, nurses, and other medical workers. Medical personnel face significant daily stress since they could lose their lives or health while doing their regular duties [3, 6].

As the pandemic progress there is a case of general panic among people [7], because of a lot of uncertainty about its clinical presentation, epidemiological features, fast transmission pattern and deaths among health professionals. Health care workers who are in direct contact with suspected and confirmed corona virus cases have an additional source of fear; transmission of infection among their beloved ones in addition to lack of manpower and decrease of resources. Workplace aspects can play a crucial role on moderating or worsening mental health of people facing this pandemic scenario [3].

Numerous factors appear to have a detrimental effect on health care professionals' ability to function in the face of the COVID-19 pandemic. From the perspective of the managing staff, it's critical to understand these factors, effectively combat them, and plan future crisis management strategies. The psychological effects of COVID-19 among HCWs have recently been discussed in some research papers [8]. The Egyptian health care system is overcrowded, highly variable (public vs. private), and generally underfunded. In a situation with few resources, determining the scope of mental health issues may be crucial to the ongoing battle against the epidemic. There are very few studies that evaluate the pandemic's psychological effects on Egyptian health care workers.

AIM OF THE STUDY

The researchers aims to estimate the prevalence of stress among health care workers and their coping strategies during COVID-19 pandemic.

POPULATION AND METHODS

Study design: An observational, descriptive, cross-section study.

Study duration and setting: Different hospitals in Mansoura city during a two months period (from 1st July to 30th august 2021).

Study population: Health care workers from different hospitals in Mansoura city with inclusion criteria of willing to participate, dealing with suspected or confirmed COVID-19 cases.

Sample size calculation:

The sample was selected through non-probability snowball sampling method. Its size calculation was based the prevalence of stress among HCWs during COVID-19 pandemic (15.5%)[9]. The calculated sample size of the study was at least 202 HCWs, using the formula $\{n = \frac{Z^2\ P(1-P)}{d^2}\}$ [10], where: Z = 1.96 for 95% confidence level. P = expected prevalence (15.5%). d = precision (margin of error) = 0.05.

Study tools:

Data were collected using an on-line questionnaire prepared in Google Forms in the Arabic language and then distributed through WhatsApp groups of HCW, the raw data in Excel were collected for statistical analysis. It is formed of: (

a) questions inquiring about sociodemographic status (age, gender, marital status, residence, number of children, income satisfaction), occupational profile (job title, position, duration of work, work related stressful condition), self-reported medical condition.

(b) Perceived Stress Scale (PSS-14) [11] that was employed to estimate how much stress a person has been under in the previous month due to their circumstances. It comprises of 14 questions about subjective sentiments brought on by issues, individual experiences, behaviour, and coping mechanisms. A 5-point scale was used to determine the score, with 0 representing never, 1 representing practically never, 2 representing occasionally, 3 representing pretty frequently, and 4 representing extremely frequently. Higher scores indicate higher felt stress on a scale from 0 to 56 for the overall score. PSS-14 scores were obtained by reversing the scores on the seven positive items, e.g., 0=4, 1=3, 2=2, etc., and then summing across all 14 items. Items 4, 5, 6, 7, 9, 10, and 13 were the positively stated items.

The interpretation of the results also specified (low stress intensity/0–18 scores, average intensity— 19–37 scores and high intensity— 38–56 scores). The Arabic version had been validated and has acceptable psychometric properties [12].

(c) The Mini-COPE Coping Inventory [13]. It involved the use of the Mini-COPE coping inventory was done to assess coping mechanisms. The tool consists of 28 statements, each of which is a component of one of the 14 stress-reduction techniques. These techniques include active coping, planning, positive reframing, acceptance, humor, turning to religion, seeking emotional support, seeking instrumental support, self-distraction, denial, venting, substance use, behavioral disengagement, or self-blame. Problem-focused techniques include proactive coping, planning, and

enlisting help, seeking emotional support, turning to religion, or denial are examples of emotion-focused strategies. Respondents select one of four alternatives to describe their attitudes toward each statement and receive scores based on the following rules: "I almost never do it"—0, "I almost never do it"—1, "I rarely do it"—2, "I almost always do it"—3. Each strategy was evaluated separately based on the average score obtained from the two statements assigned to it. The Arabic version was validated and has satisfactory psychometric properties [14]. The Mini-COPE scale is the most widely used tool for describing coping strategies.

Ethical approval:

The Institutional Research Board, Faculty of Medicine, Mansoura University provided ethical approval (reference number R.21.12.1567.R1.R2). After being briefed on the purpose of the study and before data was collected, participants electronically provided written informed consent. Those who agreed to participate finished the application process. Each respondent was free to leave the study at any time. The information was kept private in accordance with the revised Helsinki Declaration on Biomedical Ethics.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) version 20 was used for statistical analysis (IBM, SPSS Statistics, New York, USA). For quantitative data, descriptive analysis was performed using the mean and standard deviation (SD). The chi-square test was used to examine statistical associations, while frequencies and percentages were used to express qualitative data. A statistically significant P-value of less than 0.05 was used. To predict independent variables of perceived stress, adaptive and maladaptive responses, binary stepwise logistic regression analysis was used. Significant univariate predictors were entered into the regression model using the forward Wald method /Enter. The adjusted odds ratios and 95% confidence intervals were computed.

RESULTS

A total of 227 HCW responded the questionnaire. With mean age of 31.11±6.92 years, half of them in the age group 30-40 years. More than three fourths (78.4%) of the participants were females, 58.6% were of urban residence, about 72% were married and having children. More than half were nurses (55.5%), 54.2% reported COVID-19 direct exposure. Most of the participants (89%) had governmental work with 58.1% hired in central/insurance hospitals, while 71.8% were working in private hospitals and centers. Nearly 60% reported being not satisfied with their income. About one third (34.8%) of the studied group worked less than 5 years, while 30.8% worked more than 10 years. Furthermore, 22% of health care workers had associated co-morbidities.

The majority (78%) of health care workers had moderate stress while 21% had severe stress. **(Figure1)**. The mean stress score was 27.77±4.76 (non-tabulated data).
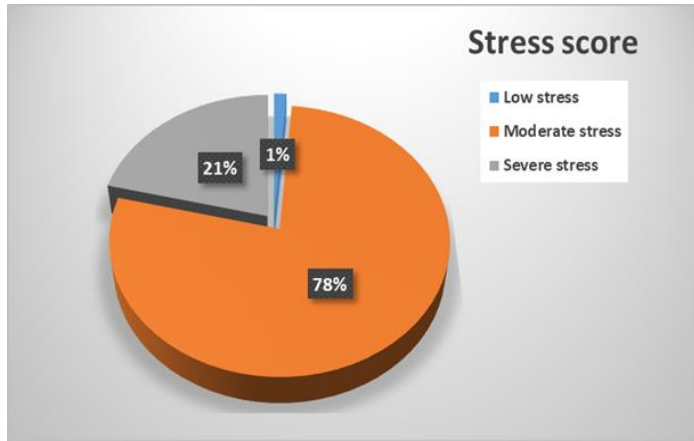
Figure (1): The distribution of health care workers according to stress score among the study participants (No= 227).

Table **(1)** shows that the mean score of adaptive/approach coping strategies was observed to be higher than the mean score of maladaptive coping strategies (45.6±11.22 vs 27.3±6.71). Participants were more likely to cope with stress through religious approach (5.97±1.32) positive reframing (5.85±1.32) and planning (5.85±1.23). Self-distraction was the most common used maladaptive/avoidant coping strategy, while substance use was the least common one.

Table (1): Mean score of the adaptive and maladaptive coping domains among the study participants (No= 218).

Adaptive domains	Mean±SD	Maladaptive domains	Mean±SD
Active coping	5.7±1.31	Behavioral disengagement	4.18±0.92
Instrumental support	5.39±1.22	Denial	4.50±0.91
Planning	5.85±1.32	Self-distracting	5.62±1.12
Acceptance	5.72±1.13	Self-blame	5.21±1.13
Emotional support	5.49±1.11	Substance use	2.30±0.41
Humor	5.64±1.10	Venting	5.53±1.31
Positive reframing	5.85±1.23		
Religious	5.97±1.32		
Adaptive coping total	45.61±11.22	Maladaptive coping total	27.34±6.71

SD, Standard Deviation; No., number.

Table **(2)** personal factors associated with suffering from severe stress were being divorced or widow (OR=4.75), with present history of comorbidity or Psychiatric disease (OR=2.13, OR=5.9) and with minimal sleeping duration (4 to 6 hours) with statistically significant difference. Low / moderate adaptive strategies were significantly prevalent among divorced or widows (OR=8.25). On the other hand, living in rural areas was significantly protective factor against low to moderate adaptive response (OR=0.51). There were no factors significantly associated with high maladaptive response.

Table (2): Relation between personal factors and severe stress, maladaptive and adaptive responses among the study participants (No.= 227).

	Personal Characteristics	Severe Stress		H. Maladaptive Response		L. to M. Adaptive Response	
		No. (%) -21.10%	COR (95% CI)	No. (%) -7.40%	COR (95% CI)	No.(%) (67.4%)	COR (95% CI)
Age gps (yrs)	<30	19(20)	2.5(.87-7.4)	6(6.3)	0.3(.08-1.4)	66(69.5)	1.4(0.5-4.1)
	30-40	22(19.3)	0.9 (0.48-1.8)	8(7.0)	0.3(.09-1.5)	76(66.7)	1.2(.4-3.5)
	>40 (r)	7(38.9)	1	3(16.7)	1	11(61.1)	1
Sex	Male (r)	7(14.3)	1	4(8.2)	1	35(71.4)	
	Female	41(23)	1.79 (.7-4.2)	13(7.3)	1.1(.3-3.6)	118(66.3)	0.78(0.4-1.6)
Marital status	Single (r)	9(19.1)	1	5(10.6)	1	31(66)	1
	Married	30(18.4)	0.9(0.4-2.1)	11(6.7)	0.6 (0.2-1.8)	106(65)	0.9(.4-1.9)
	others#	9(52.9)	4.7(1.4-15.7) *	1(5.9)	0.5 (0.05-4.8)	16(94.1)	8.2(1.0-68.0) *
Having children	No(r)	13(20.3)		6(9.4)		44(68.8)	
	Yes	35(21.5)	1.1(.5-2.1)	11(6.7)	1.4(0.5-4.0)	109(66.9)	0.9(0.4-1.7)
Residence	Rural	21(22.3)		5(5.3)		55(58.5)	
	Urban (r)	27(20.3)	1.1(0.6-2.1)	12(9.0)	1.7(.6-5.1)	98(73.7)	0.5(0.2-0.8) *
Comorbidities	No (r)	32(18.1)		13(7.3)		118(66.7)	
	Yes	16(32.0)	2.1(1.05-4.3) *	4(8)	1.09(0.3-3.5)	35(70)	1.16(0.6-2.3)
Psych. history	No (r)	45(20.3)	1	17(7.7)	1	150(67.6)	1
	Yes	3(60)	5.9(0.9-36.3) *	0	Undefined	3(60)	0.7(0.1-4.4)
Sleep duration (hrs)	<4 (r)	1(4.8)	1	3(14.3)	1	6(28.6)	1
	6-Apr	25(30.5)	8.7(1.1-69.0) *	4(4.9)	0.3(.1-1.5)	57(69.5)	5.7(1.9-16.4) *
	8-Jul	20(18.9)	4.6(.6-36.7)	9(8.5)	0.5(.137-2.2)	77(72.6)	6.6(2.3-18.8) *
	>8	2(11.1)	2.5(0.2-30.1)	1(5.6)	0.3(.03-3.7)	13(72.2)	6.5(1.6-26.4) *

No., number; COR: crude odds ratio, AOR: Adjusted odds ratio, r: reference group; gps, group; yrs, years; H.., High; L.to M., Low to Moderate; hrs, hours; Psych. History, Psychiatric history. #Divorced/widow; *statistically significant (p<0.05)

Severe stress is associated significantly with participants working directly with COVID19 patients, in primary health units, not satisfied with their income. Meanwhile, HCW with working duration less than 10 years had higher risk to low/moderate adaptive response. Being a nurse or technician working in governmental, university/central, not working in private health facility are protective factors against low adaptive response **(Table 3)**.

Table (3): Relation between occupational factors and severe stress, maladaptive and adaptive responses among the study participants (No= 227).

Occupational Characteristics	Sever Stress		H. Maladaptive Response		L. to M. Adaptive Response	
	No.(%) 21.1%)	COR(95% CI)	No.(%) (7.4%)	COR(95% CI)	No.(%) (67.4%)	COR(95% CI)
COVID Contact						
Direct	33(26.8)	2.18(1.1-4.2)*	12(9.8)	2.1(.7-6.3)	82(66.7)	0.93(0.53-1.62)
Indirect (r)	15(14.4)		5(4.8)		71(68.3)	
Profession						
Physician (r)	12(20)	1	3(5.0)	1	47(78.3)	1
Nurse	26(20.6)	1.1(0.4-2.2)	12(9.5)	2.0(.5-7.4)	75(59.5)	0.41(0.20-0.83)*
Technician	5(29.4)	1.6(0.5-5.6)	0	undefined	9(52.9)	0.31(0.10-0.96)*
Others[#]	5(20.8)	1.1(0.3-3.4)	2(8.3)	1.7(0.3-11.1)	22(91.7)	3.04(0.63-14.66)
Governmental						
No(r)	7(28)		0	undefined	22(88)	0.25 (0.1-0.7) *
Yes	41(20.3)	0.6(0.3 -1.7)	17(8.4)		131(64.9)	
Private						
No	27(16.6h)	2.5(1.3-4.8) *	12(7.4)	1.07(0.4-3.2)	97(59.5)	0.2 (0.1-0.5) *
Yes **(r)**	21(32.8		5(7.8)		56(87.5)	
Health Institution type	9(20)	1	1(2.2)	1	23(51.1)	1
University (r)	24(18.2)	0.9(0.4-2.1)	14(10.)	5.2(0.7-40.9)	86(65.2)	0.2(0.5-40.1) *
Central	5(62.5)	6.7(1.3-33.3) *	02(4.8)	undefined	8(100)	0.38(0.18-0.8) *
Health unit insurance	10(23.8)	1.3(0.5-3.5)		2.2(.2-25.2)	36(85.7)	undefined
Income satisfaction	1(3.2)	1	3(9.7	1	18(58.1)	1
Present	11(18.3)	6.7(0.8-54.8)	4(6.7)	6 (.1-3.2)	37(61.7)	1.2(0.4 -2.8)
Not sure	36(26.5)	10.8(1.4-82.1) *	10(7.4)	07(.2-2.8)	98(72.1)	1.8 (0.8 -4.1)
Absent						
Work Duration						
<5	15(19)	1.3(.5-2.9)	5(6.3)	0.5(.2-1.7)	58(73.4)	3.7(1.8-7.3) *
5-10	22(28.2)	2.1(0.9-4.7)	4(5.1)	0.4(.1-1.5)	65(83.3)	6.7(3.1-14.3) *
>10 (r)	11(15.7)	1	8(11.4)	1	30(42.9)	1

No., number; COR: crude odds ratio, AOR: Adjusted odds ratio, r: reference group; H.., High; L.to M., Low to Moderate
[#] respiratory therapist& housekeepers; * statistically significant (p<0.05).

There was statistically significant positive correlation between total stress score and each strategy of adaptive coping strategies (non-tabulated data). Moreover, there was statistically significant positive correlation between total stress score and total maladaptive coping score and between total stress score and each strategy of maladaptive coping strategies except for substance use which was non-significant (*p*>0.05) **(Figure 2)**.
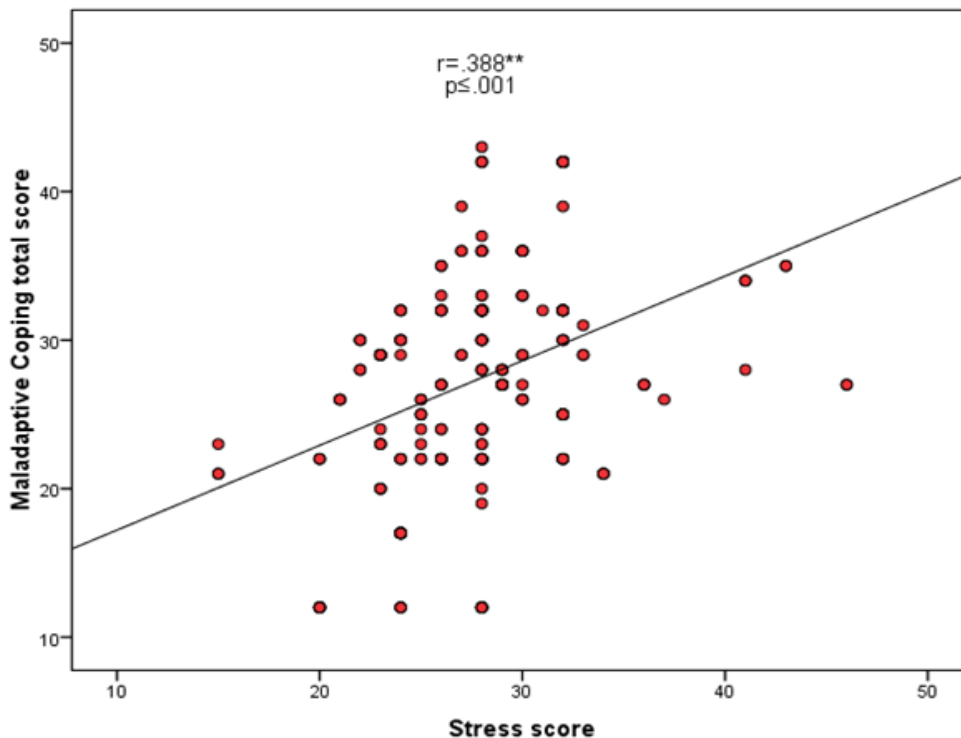
Figure (2): Scatter diagram illustrating the correlation between total stress score and total maladaptive coping score among the study participants (No= 227).

DISCUSSION

The COVID-19 pandemic is different from any other pandemic that has ever occurred. The impact of this pandemic will be felt by individuals involved in health care for many years to come. Many people have been negatively affected, psychologically, especially among medical staff. A study from China found that 12.6% of health care workers in the epicenter of the pandemic, the city of Wuhan, were experiencing severe mental distress, versus 7.2% in less affected regions of China [15]. Other studies have also emphasized a high severity of stress, as well as symptoms of depression, anxiety, and insomnia among health care personnel working with patients infected with COVID-19 [16].

The present study attempts to assess the prevalence of stress among health care workers and their coping strategies during COVID-19 pandemic. Contrary to expected, high prevalence of stress was found even when they reported having used positive, adapting coping strategies during the epidemic. The majority (78%) of the sample suffer moderate level of stress while 21% have severe stress **(Figure 1)**. These findings are similar to other study conducted in China [17] where 32.23% reported high stressed, a study conducted by **Kim et al.** [18], which reported 80.1% had moderate/high stress and a study in Nepal which found that 62.5% of Nepalese nurses were stressed during the pandemic [19]. Whereas the prevalence of stress in the present study contradicts previous studies as low level of stress experienced by health care workers [20].

The highest prevalence of stress was reported in the study of **Abdullah et al.** [21] with 93.7%, and the lowest prevalence was related to the study of **Chew et al.** [22] with 5.2%.

In the present study the mean stress score was 27.77±4.76 (non-tabulated data), while in the study of **Cui et al.** [17] to assess stress among nurses in emergency departments and fever clinics using PSS14, the mean stress score was 21.09±7.76. Researchers used PSS 10 obtained nearly close results, [16, 23].

As for the personal variables, factors associated with severe stress were marital status (being divorced or widow), having co-morbidities and having a psychiatric history. Indeed, females showed higher levels of stress than males with no statistically significant difference (**Table 2**). That in line with previous literature that found significant association between stress and being married [19, 24].

In the current research, having children was not associated with perceiving stress. However, another study during the COVID-19 pandemic found that health care workers in USA who had children at home, perceived less distress [25]. Age in the present study had no association to stress. **That contradicts Nayak et al.** [26] that found HCWs in the age category 30 years and below, were experiencing higher level of stress.

The analysis of occupational factors of the present research showed that direct contact with COVID patients was associated with severe stress. This is in accordance with **Sagherian et al.** [27] in the United States and contradicted **Sierakowska and Doroszkiewicz** [8].

In the current results revealed no association between profession type and occurrence of stress

(Table 3). These findings contradicted **Shah et al.** [9] who found stress was highest among nurses, followed by physicians. In another study by **Grandinetti et al.** [28], physicians suffered more moderate to severe stress.

Many people have found different ways to cope with the stress caused by COVID-19. People cope differently depending on the culture, personality and the context of the outbreak situation, but the most common coping strategies in previous literature were positive and problem-oriented [29]. Brief-COPE questionnaire was chosen because of the validated assumption that an individual's preferred coping strategies remain relatively unchanged across different stressors [30].

The participants of the current study showed higher adaptive coping strategies than maladaptive coping strategies (Table 1). Participants were more likely to cope with stress through approach strategies such as positive reframing and planning. This is in harmony with the study of **Thai et al.** [31] where acceptance and active coping were the predominated approach coping strategies. Moreover, among avoidant coping strategies in our study, self-distraction strategy was the most common while substance use had the lowest score (Table1). It was similar to results of **Thai et al.** [31] and **Ziarko et al.** [32]. In another study by Sierakowska **and Doroszkiewicz** [8], the most common strategies of coping with stress (Mini-COPE) were active coping and planning, as well as emotional support.

In the current study divorced or widows HCW showed low / moderate adaptive strategies. Being a nurse or technician, living in rural areas, working in governmental, university/central, not working in private health facility protect against low adaptation (Table 2, 3). **Elkayal et al.** [33] in their study among general population in Egypt found the most adaptive people were the residents in the cities with a monthly income sufficient enough to meet their needs; better adaptation methods were also seen among both divorced and highly educated people. The differences may be due to alternative target populations. **Yubonpunt et al.** [34] in their study found that health care workers who had children in their household were more associated with the overall Brief-COPE score.

In the current study, statistically significant positive correlation between total stress score and the overall maladaptive coping score was found (**Figure 2**). Correspondingly, **Saczuk et al.** [35] found that the higher the PSS-10 score, the less frequently problem-focused coping strategies, such as planning, active Coping, seeking Instrumental Support, and positive reframing, or emotion-focused strategies, i.e., acceptance, humor, religion, and seeking emotional support, were chosen (negative correlation). On the contrary, they discovered that a high PSS-10 score increases the frequency of choosing emotion-focused coping, such as self-blaming and venting, or avoidant coping, such as self-distraction, substance use, and behavioural disengagement or denial (positive correlation).

Study limitation:

This study had a limitation that participants' reactions were measured only at a point in time. Actually, the complex interrelationship between home and work stressors, lockdown restrictions, coping strategies, and symptoms of poor mental health. This cannot be clarified by cross-sectional studies alone. Longitudinal studies are urgently needed for better understanding relationship between these factors. Also, qualitative research barriers to access to support services should be investigated, to what extent these reflect long-standing patterns of poor help-seeking whether there were behaviors among health care workers, or unique factors associated with the pandemic.

CONCLUSIONS AND RECOMMENDATIONS

High job demands, increased work responsibilities, fear from infection transmission and many other stressors have put health care workers under unusual level of stress during COVID-19 pandemic. Managing stress together with enhancing adaptive coping strategies is a war deserving fighting in order to maintain intact mental health not only in health care providers, but also in all stressful careers. Based on our research results, we recommend providing health care workers with workshops and training courses to help them dealing with their perceived stress. In addition, administrative interventions can play crucial role in minimizing work related stressors.

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