Research Article

Assessment of the Psychological Stress Experienced by COVID Warriors during COVID-19 Pandemic in India

Shikha Vardhan[1], Sudarshan Ramaswamy[2], Meera Dhuria[3], Rinku Sharma[4],

Aman Pratap Singh[5], Smita Deshpande[6], Pradeep Kumar Kanaujiya[7], Alka Aggarwal[8],

Sudhir Kumar Jain[9], Suneela Garg[10], Sujeet Kumar Singh[11]

[1]Joint Director, Centre for Environmental & Occupational Health, Climate Change & Health, National Centre for Disease Control (NCDC), DGHS, MoHFW, Delhi, India.
[2]WHO Consultant - Health Emergencies, NOA at NCDC, Delhi, India. / World Health Organization, WCO, Delhi, India.
[3]Joint Director, Epidemiology Division, [11]Director, National Centre for Disease Control (NCDC), DGHS, MoHFW, Delhi, India.
[4]Joint Director, Centre for Non-Communicable Diseases, National Centre for Disease Control (NCDC), DGHS, MoHFW, Delhi, India.
[5]HOD Paediatrics Department, Bhagwan Mahavir Hospital, H-4/5, Pitampura, Delhi, India.
[6]HOD Psychiatry Department, ABVIMS- Dr RML Hospital New Delhi, India.
[7]Specialist - Pediatrics, [8]Medical Superintendent, Bhagwan Mahavir Hospital, H-4/5, Pitampura, Delhi, India.
[9]Additional Director & Head Epidemiology Division, National Centre for Disease Control (NCDC), DGHS, MoHFW, Delhi, India.
[10]Professor & Head, Community Medicine Department, Maulana Azad Medical College & Associated Hospitals New Delhi, India.
DOI: https://doi.org/10.24321/0019.5138.202168

I N F O

Corresponding Author:
Rinku Sharma, Centre for Non-Communicable Diseases, National Centre for Disease Control (NCDC), DGHS, MoHFW, Delhi, India.
E-mail Id:
rinkusharma2005@gmail.com
Orcid Id:
https://orcid.org/0000-0002-4977-5064

A B S T R A C T

Introduction: In the fight against COVID-19, doctors, nurses, administrative staff, police personnel and other supporting staff have been in the frontline providing emergency services. While performing their duties, they are at risk of getting infections and transmitting them to their near and dear ones. This can lead to increased psychological stress levels among them. This study was conducted to assess the level of stress among health care workers and police personnel during the COVID-19 pandemic period in Delhi.

Methodology: This is a cross-sectional study among the COVID-19 warriors working in designated COVID-19 hospitals using Google forms. The relationship between various social, demographic, and administrative factors and the level of stress experienced by the study subjects was assessed using Perceptive Stress Scale (PSS-10).

Results: The results describe heightened severity of perception of stress among the study cohort. We found at least 10 risk factors that showed statistically significant association with increased TPSS in the studied cohort group.

Conclusion: There is an urgent need for screening, proper diagnosis, and management of psychiatric issues among FLCWs, and for expanding mental health services for reducing stress among the target population.

Keywords: Perceptive Stress Scale (PSS-10), Social stigma, Workload stress, PPEs, Mental health

7

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)
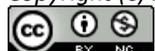
pandemic and has reported over four lakh cases of COVID-19 and close to four thousand deaths as of May 06, 2020. This has put tremendous pressure on the healthcare system (infrastructure and manpower). Doctors, healthcare professionals, and other frontline COVID warriors are facing an overwhelming workload, more so than ever since the start of the current pandemic in India. Workplace stress among professionals providing essential services is usually known to be high, due to the virtue of their occupational requirements. Many studies conducted in the pre-COVID era have reported that the occupational stress endured in the medical profession is so intense that medical professionals are at higher risk of morbidity and mortality due to non-communicable diseases.[1,2] High rates of burnout have been reported among doctors and related healthcare professionals globally, potentiating the need to assume greater responsibility in addressing the issue, even more so during this pandemic.[3] Various studies have provided evidence of experiencing significant psychological stress among people providing essential services during the COVID-19 pandemic situation.[4-8] Hence, it is essential to address the issue of mental stress and in the long run, mental fatigue of personnel involved in providing emergency health care services. A systematic review encompassing studies from across the globe conducted on the psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers highlights the importance of a preventative approach to mitigate the development of psychological manifestations.[9] It emphasises the need for high-quality longitudinal research to galvanise the implementation of psychosocial support systems in multiple modalities/ levels, designed to suit specific characteristics of frontline health workers empowering them in the critical role they play against epidemics.[9]

In the fight against the COVID-19 pandemic in India, health care personnel (doctors, nurses, supporting staff, front line workers, and administrative staff) and police are some important key people. While performing their duties, they themselves are at risk of getting infections and transmitting them to their near and dear ones. Delhi is one of the state/ UT which is facing high cases and deaths due to COVID-19 which is putting most of the frontline professionals directly and indirectly under stress to meet the demands of their professional and personal life. In addition to the usual stressful work profile as reported by various studies mentioned above, the pandemic management workload has only aggravated the concern; in most places, it is associated with a lack of administrative support, hence certainly taking a toll on these people. Related pieces of evidence on stress perception among this section of people are poor in our country, hence a study to assess the psychological stress experienced by COVID warriors was conducted among the

staff working in hospitals admitting COVID-19 patients and police officers dealing with and ensuring maintenance of COVID-19 protocols among the general public during the current COVID-19 pandemic. The study was conducted during the first wave in India and it is intended to give insights into the psychological stress perception among these high-risk groups, a study from which inputs can be drawn to take preventive and responsive interventions among these groups against potential burnout during the second wave or in future.

Objectives

- To assess the level of stress among health care workers and police during the COVID-19 pandemic period in Delhi
- To study the relationship between various social (support from institutions/family, stigma and discrimination), demographic (age, sex, distance between home and workplace), and administrative factors (availability of PPE, training) and level of stress experienced by the study subjects

Methodology

A cross-sectional study among the COVID warriors including health care workers (doctors, nurses, administrative staff) working in designated COVID hospitals of Delhi and police personnel attached to the COVID health facility in Delhi, was conducted from 15 July to 15 August 2020. Technology has been used in many innovative ways in the COVID-19 pandemic worldwide to transform the health care system such as tracking of cases, surveillance of containment zone etc. For facilitating the process of data collection and not to overburden the COVID warriors with one more task, Google Forms were used to distribute a pretested, semi-structured questionnaire among the participants. All the participants were informed about the study procedure, data collection methods and anonymization of all personal data. Only the participants who provided verbal informed consent and gave a history of working for at least past one month from the date of interview were included in the study; the rest were excluded. As the cohort included a limited section of the society (frontline COVID warriors in designated COVID hospitals during July 2020 in Delhi), convenient sampling was used for the study and all consenting COVID warriors were included, thus a total of 133 individuals participated in the study. Data were collected from in-charge doctors on shift duties in COVID hospitals, staff nurse in-charge, nursing staff on shift duties and police personnel working with the COVID health facilities.

The questionnaire was used to collect information on various socio-demographic and administrative variables (eg, age, sex, total family members, support from family/ institution, discrimination, fear etc.) which were found

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

8

by the literature review to possibly affect the stress level among the frontline healthcare professionals and other COVID warriors. A standardised Perceptive Stress Scale (PSS-10)[10] was used to assess the perceived stress among the participants. No ethical approval was obtained as the study was conducted on an emergency basis to understand the mental health status of FLCWs during the time of lockdown. The study included only observational questionnaire-based interview and no clinical or public health interventions were done during the course of study.

Data obtained was tabulated in MS Excel and the factors responsible for abnormally high perceived stress levels were analysed using correlation and regression analysis using SPSS software.

Results

Out of the total 133 participants in our study, 72 (54.1%) were male and the rest were female. The mean age of the study population was 38.87 years (range 22-60 years, SD 8.9). 29 (21.8%) participants were 30 years or less in age, 49 (36.8%) were between 31 and 40 years, 42 (31.6%) were between 41 and 50 years, and 13 (9.8%) were between 50 and 60 years of age. Our study included 35 (26.3%) doctors, 10 (7.5%) nurses, 17 (12.8%) paramedical staff, 9 (6.8%) admin staff, 54 (40.6%) police personnel, and 8 (6.0%) other frontline COVID warriors. 93 (82.0%) among the study participants were married, 5 (3.8%) were widowed and the rest were unmarried. The average family size was 5.33 individuals (range 2-16, SD 2.066). The average daily working hours among the study subjects were 9.18 hours (range 6-17 hours, SD 2.528) which were higher in males (9.8 hours) as compared to females (8.46 hours).

Perceived stress among the study participants was calculated as TPSS (Total Perceived Stress Scale) score based on 10 parameters of PSS-10 scale. TPPS score ranges from 0-40 and is categorised as 0-13 (mild), 14-26 (moderate) and 27-40 (severe). Out of the total 133 participants, 117 answered all the 10 questions and were considered for analysis related to the TPPS score. It was noticed that 49 (41.9%) participants had a TPSS score of 27-40 (high stress level), 63 (53.8%) had a TPSS score of 14-26 (moderate stress level) and only 5 (4.3%) had a TPSS score of less than 13 (low stress level). The overall mean TPSS score of the 117 participants was 24.14 (range 2-39, SD 7.177).

The distribution of the mean TPSS score among the various groups (profession, age group, gender, marital status, presence of family members with co-morbidity, presence of any member more than 60 years of age in the family, and training on what precautions need to be taken as a Front line COVID-19 warrior - FLCW) was estimated. The details have been shown in Table 1. Unpaired t-test was applied for variables containing two categories and ANOVA

for variables with three or more categories. Perceived stress was maximum among police personnel (TPSS 29.85, SD 4.582) and minimum among doctors (TPSS 18.55, SD 5.259). TPSS score for nurses, paramedical staff, admin staff and other FLCWs was found to be 22.22 (SD 5.718), 18.9 (SD 4.358), 18.56 (SD 5.364) and 23.5 (SD 5.648) respectively. Professionally, doctors, nurses and paramedical staff were considered as Healthcare COVID Warriors (HCW) whereas admin staff and police were categorised as Non-healthcare COVID warriors (NHCW) for analysis. As per the age group, the highest stress perception was noticed among 31-40 years age group followed by 41-50 years age group. It was noticed that males were having significantly higher TPSS score as compared to females. Although married participants perceived a higher level of stress as compared to unmarried and widowed, the difference was not statistically significant. Presence of family members with co-morbidity, presence of any member aged more than 60 years in the family and absence of training among FLCWs, all showed a significantly higher TPSS score as compared to their respective counterparts.

All groups (dependent variables) in Table 1 with statistically significant (p value < 0.05) differences in TPSS scores (independent variable) and containing only two categories were further included for regression analysis (linear regression). Forward Likelihood Ratio (LR) was used to find the significant predictors of the dependent variables. The criteria for entering and removing the independent variables from the forward stepwise model were $p \leq 0.05$ and $p \geq 0.10$ respectively. In the final model, all possible interactions having biological plausibility were checked. It was found that the variables "profession", "presence of family members with co-morbidity", "presence of any member more than 60-years of age in the family" and "getting training on precautions" were statistically significant at $p < 0.001$, $p = 0.005$, $p = 0.007$, and $p = 0.045$ respectively (Table 2). With a combined R value of 0.72 and adjusted R squared value of 0.50, our model predicted that 30% of variability in the dependent variable TPSS score can be explained by the four significant variables. The full model was found to be statistically significant at $p < 0.001$.

It was noticed in our study that subjective perception of risk of contracting COVID-19 to themselves/ their family members was high among the study participants (Figure 1). More than 65% of the participants perceived a risk of 4/5 or 5/5 on the Likert scale. It was also noticed that the total family members had a positive correlation with the TPSS score as well (Figure 2) with $R^2 = 0.103$ and correlation co-efficient = 0.321 (p-value < 0.001). While there was no significant correlation (p-value = 0.740) between TPSS score and distance from the duty station (correlation co-efficient = -0.29, $R^2 = 0.0008$), a statistically significant positive

9

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

correlation (p-value < 0.001) was seen between TPSS score and average number of daily duty hours (correlation co-efficient = 0. 443, R^2 = 0.1962) which is depicted in Figure 2.

Since the average daily working hours among females was 8.46 hours and among males, it was 9.8 hours, and TPSS score increases with an increase in daily duty hours, one of the factors leading to the statistically significant gender-based difference in TPSS score (Table 2) can hence

be attributed to the number of hours of daily work. We found that the availability of PPEs had a significant impact on the TPSS score. The odds of having a TPSS score of ≥ 20 was 7.2 times higher among those who did not get regular PPEs as compared to those who got them (Table 3).

Total PSS Score was compared with a series of questions assessing the perception on "level of discomfort (LoD) felt while on duty", "impact of social stigma (SS) in the

Table 1. Distribution of TPSS Score among Various Categories/ Sub-groups (n = 117)

| Group	Category	N	Mean TPSS score	Std Deviation	P-value
Profession	HCP	62	20.56	5.542	< 0.001*
	NHCP	55	28.16	6.694	
Age group (years)	≤ 30	27	22.59	8.121	0.416
	31-40	41	25.05	7.096	
	41-50	39	24.56	6.809	
	51-60	10	22.2	6.07	
Gender	Female	52	22.0	5.015	< 0.001*
	Male	65	25.8	8.231	
Marital Status	Married	93	24.40	7.451	0.168
	Unmarried	19	24.42	5.559	
	Widowed	5	18.2	2.646	
Presence of family members with co-morbidity	Yes	76	26.44	7.012	< 0.001*
	No	41	19.78	5.308	
Presence of any member > 60 year old in the family	Yes	65	27.3	6.953	< 0.001*
	No	52	20.13	5.284	
Got training on what precautions need to be taken as a FLCW	Yes	27	20.78	10.04	0.01*
	No	90	25.14	8.668	

* Variables used for regression analysis.

**Table 2. Regression Coefficients of Significant Variables for TPSS Score**

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% CI for B	
	B	Std Error	Beta			Lower Bound	Upper Bound
Constant	24.262	2.632	-	9.218	< 0.001	19.046	29.479
Profession	1.795	0.286	0.450	6.287	< 0.001	1.229	2.361
Any member > 60 years in the family	-3.194	1.128	-0.213	-2.833	0.005	-5.428	-0.959
Any member in the family with a co-morbidity	-3.081	1.118	-0.214	-2.757	0.007	-5.296	-0.866
Got training on what precautions need to be taken as a FLCW	1.445	0.713	0.141	2.028	0.045	0.033	2.858

Dependent Variable: Total PSS Score.

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

10
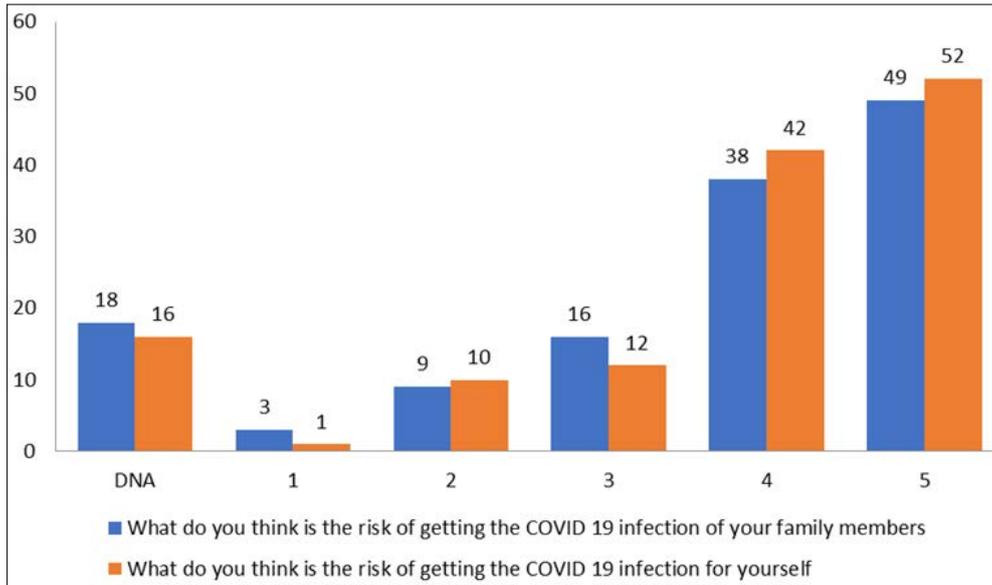
Figure 1.Subjective Perception of Risk of Contracting COVID-19 (N = 133)
1-5: Subjective perception of risk in increasing order, DNA: Did not answer
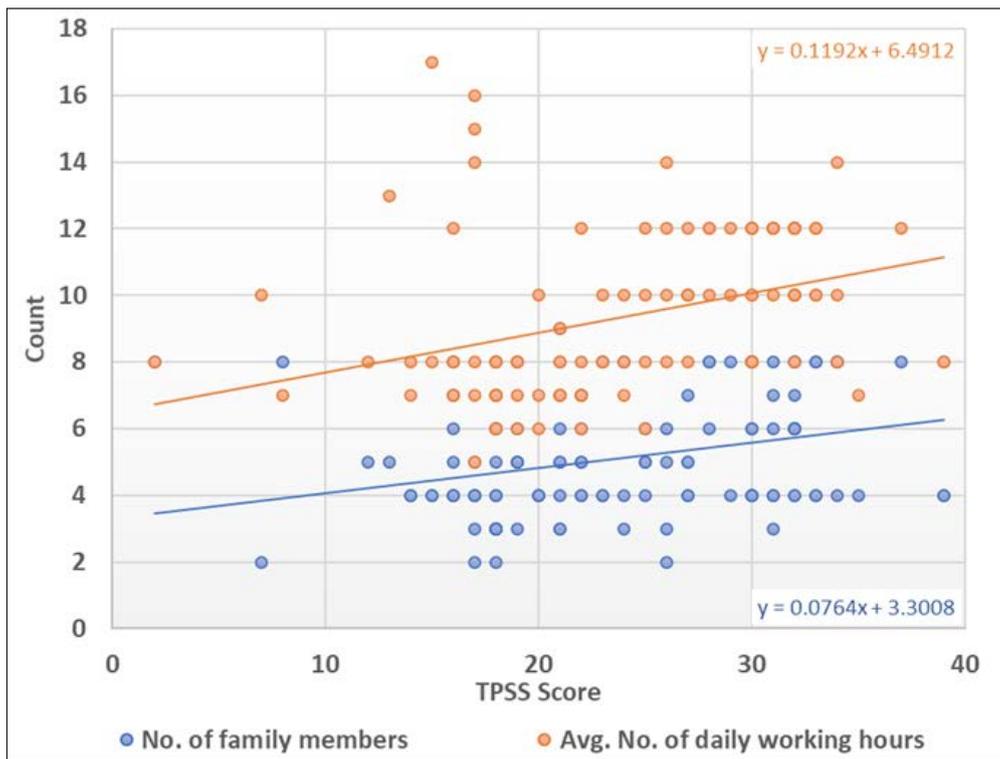
Figure 2.Total PSS Score vs Number of Family Members and Hours of Duty

Table 3.Availability of PPEs while Performing Duties * TPSS Crosstab

		TPSS Categories				Total
		≤ 9	10-19	20-29	≥ 30	
Did you get the all PPEs (as per guidelines in the context of your job) every time you were performing your duties	Not always	4	9	23	32	68
	Yes	15	26	17	7	65
Total		19	35	40	39	133

Pearson Chi-Square< 0.001, OR for < 20 vs ≥ 20 = 7.2276.

11

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)
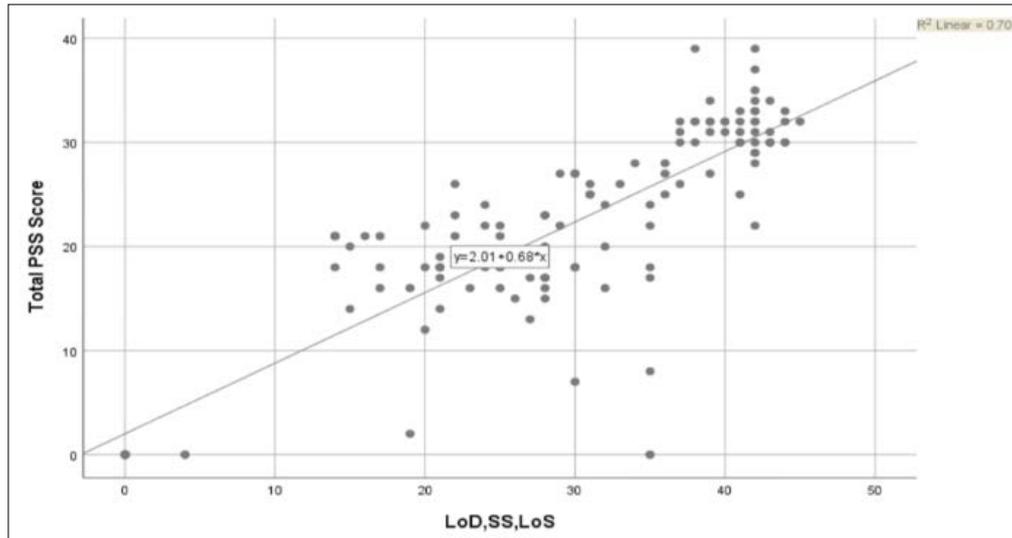
Figure 3.Total PSS Score vs LoD, SS, LoS

community on FLCW" and "lack of support (LoS) from institutions and family". We found that all three parameters had a significant positive correlation individually with the TPSS score. "TPSS score vs LoD felt while on duty" showed a statistically significant positive correlation (p-value < 0.001) with correlation co-efficient = 0.727 and R^2 = 0.529. Similarly, "TPSS score vs impact of SS in the community on FLCW" showed a statistically significant positive correlation (p-value < 0.001) with correlation co-efficient = 0.776 and R^2 = 0.602, and "TPSS Score vs LoS from institutions and family" showed a statistically significant positive correlation (p-value < 0.001) with a correlation co-efficient = 0.612 and R^2 = 0.374. Since all three parameters showed a significant positive correlation with TPSS scores, a combined score of LoD, SS, and LoS was plotted against TPSS score as shown in Figure 3. With correlation co-efficient = 0.841 and R^2 = 0.70 (p-value < 0.001), it can be concluded that 70% of variance in TPSS score can be explained by a combination of LoD, SS, and LoS.

Discussion

With an overall mean TPSS score of 24.14**,** the results describe heightened severity of perception of stress among the study cohort. The overall score was higher than that reported in the general population (< 13 according to Cohen et al. in 1988), higher than the values reported by Chua et al. in 2004, during the SARS outbreak in 2003 and also higher than previously reported studies in the world during to the COVID-19 pandemic (17.4 as per Limcaoco RS et al.).[10,11,12] In a nationwide survey conducted (to assess stress among doctors) during the COVID-19 pandemic, it was reported that maximum respondents (71%) had moderate stress levels and similar findings are seen in our study.[13] The second commonest category perceived in the above-mentioned study was low (21%), followed by high (8%). Comparatively, our study perhaps found that

around 42% had high perceived stress levels. This could be explained by the fact that our study included other frontline COVID warriors in addition to doctors. However, it could be further justified by comparing the mean score of various professionals in our study which was lowest among doctors and highest among police personnel. Comparatively, lower stress levels were seen among doctors probably because they were more aware of the disease and were used to following protocols of handling sick patients by virtue of their profession. Paramedical staff and admin staff too showed comparatively lower stress levels probably because they did not directly deal with COVID-19 patients, unlike the nursing staff who showed higher stress levels. Police and other frontline COVID warriors showed the highest stress levels probably because the situation of the pandemic was a very unusual and unexpected event, hence a higher subjective stress perception is seen.[14] Perceived stress was found higher in the younger age group as compared to the older counterparts similar to a study by Halder A et al. which showed significantly higher stress levels in the age group below 50 years as compared to the one above it.[15] This could be probably explained by the fact that since elder age groups are at higher risk of co-morbidities and death due to COVID-19, the work responsibilities were shifted to young adults who are capable of handling the situation and also are at lesser risk of mortality. Although in Table 1, gender showed a significant difference in TPSS scores, it was not found to be so later in regression analysis (Table 2). This difference in stress levels can be actually attributed to the higher number of average working hours among males (9.8 hours) as compared to females (8.46 hours).

Our study found that the FLCWs clearly had higher perceived stress levels than expected. We found at least 10 risk factors that showed statistically significant association with increased TPSS in the studied cohort group. They are

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

12

as follows: profession (NHCPs > HCPs), presence of family members with co-morbidity, presence of any member more than 60 years of age in the family, lack of training on what precautions need to be taken as a FLCW, number of family members, average number of daily working hours, not getting PPEs regularly, level of discomfort felt while on duty, impact of social stigma in the community on FLCW, and lack of support from institutions and family. These can be further categorised into non-modifiable (4 - profession, family members with co-morbidity, presence of any member aged more than 60 years, number of family members) and modifiable (other 6) risk factors. Active interventions in addressing modifiable risk factors are thus highly recommended to reduce the stress levels among FLHW. It is also known that psychological stress also influences the occurrence and progression of other non-communicable diseases such as cardiovascular diseases and diabetes.[16,17] Prompt efforts in reducing modifiable risk factors can also help in the reduction in the burden of other non-communicable diseases. Creating a refined and better working environment for all these professionals involved in providing essential and emergency services is a key step to having a healthy ageing society.[18]

What can be done to address these issues? Lack of training, average number of daily working hours, not getting PPEs regularly, level of discomfort felt while on duty – all these are related to the level of institutional support. Real-time training during global emergencies is critical for effective preparedness and response. It is important to train FLCW to address issues such as fear of getting infected, usual mistakes leading to infection specific to their job profile, addressing social stigma, workplace safety, proper usage of protective gears etc at the institutional level. Additionally, similar courses through online learning platforms such as "OpenWHO" should be highly encouraged.[19] These courses can be translated into local languages for better effectiveness and reach. Incorporation of adequate knowledge and development of skills ensuring a safe and efficient working environment through dedicated communication channels from government organisations shall be very helpful. Provision of certifications after completion and giving rewards to high performers can further stimulate better responsiveness from the target population. Reduction of the average number of daily working hours requires adequate utilisation of existing manpower and effective human resource management, for eg, regular clinical postings of pre and para-clinical post-graduate students and training them in basic emergency management skills during post-graduation is the need of the hour. Any kind of sudden surge in demand for qualified doctors can be handled to a certain extent by such policies (a shrewder way of utilising the existing manpower, as a reserve force). Providing incentives and higher pay is recommended to attract post MBBS students to volunteer as COVID warriors while they are studying for NEET-PG exams. Such moves shall be more effective than utilising interns or final year students or trying to utilize medical professionals with non-allopathic background, as alternatives for efficient management of time and manpower during crisis situations / Health emergencies such as COVID-19. The shortage of nursing staff is also a common problem especially the nursing staff working in ICUs, and hence efforts to increase the ICU nursing staff, starting to train registered nurses from general wards to perform basic ICU procedures, and to dedicate intensive care nurses to manage more complex procedures are recommended.[20] Availability of PPEs was also a major concern among the FLCW, steps towards liberalisation of production of this necessary equipment while there is a huge surge in demand can potentially address the supply chain. However, it's also necessary for the institutions to step ahead and provide the necessary PPEs adequately on a regular basis. Managing all these above-mentioned issues would also have a secondary impact on the psychological stress levels of FLCWs and a heightened appreciation for institutional resilience leading to better efficiency.[21]

The study findings also suggest that there is a high level of perceived fear of infection of oneself and family members (Figure 1). Lack of support from the family can also be an outcome of this fear; the family members discourage FLHW from carrying out professional obligations/ responsibilities since these duties involve a high risk of contracting COVID-19 infection. Additionally, the impact of social stigma in the community on FLCW can also be attributed as an outcome of the fear of getting infected. Stigmatisation happens due to popular false beliefs and health education is one of the key ways to address it. Risk communication and community engagement campaigns regularly should be carried out in such societies. Legislation reforms towards pro-tenancy laws, particularly focussing on COVID warriors can also be considered in certain cases.[22] Measuring the effect of pandemic stigma on FLCWs' mental/ physical health and their performance is of extreme importance. Regular studies in this regard in different settings and societies help us understand the root causes and aid in designing policies to counter the effect of social stigma.[23]

Limitations

The study was conducted using convenient sampling and hence a study with a larger sample is necessary. The study only gives a cross-sectional picture and hence repeated longitudinal studies shall be helpful for arriving at a bigger picture. The study doesn't compare the FLHW with the general population and hence the difference cannot be estimated. Such studies with comparative analysis are essential to extend the recommendations to the general

13

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

population as well.

Conclusion and Recommendations

The study findings suggest that there is an urgent need for screening, proper diagnosis, and management of psychiatric issues among FLCWs. These findings also possibly suggest the need for psychological help for FLCWs (especially NHCPs such as police personnel), who are facing significant stress due to the pandemic. There is a need to expand mental health services (eg regular counselling) for reducing stress among the target population. Efforts must be taken to ensure institutional and social support for the professionals providing emergency services during the tough times of this pandemic. We have been witnessing this COVID-19 pandemic for more than a year and since the second wave is ongoing, the situation is expected to persist for a reasonable period in time. This high level of stress is going to possibly persist/ may increase and hence, there is a need to develop a policy addressing the psychological stress and other mental health issues among the emergency workforce.

References

1. Pandey SK, Sharma V. Doctor, heal thyself: addressing the shorter life expectancy of doctors in India. Indian J Ophthalmol. 2019 Jul;67(7):1248-50. [PubMed] [Google Scholar]

2. Ramaswamy S, Joshi SM, Velankar DH, Gosavi JD. Assessment of risk scoring of non-communicable diseases among doctors in a medical college of Navi Mumbai: a cross sectional study. Int J Community Med Public Health. 2019;6:5283-9. [Google Scholar]

3. Lemaire JB, Wallace JE. Burnout among doctors. BMJ. 2017 Jul;358:j3360. [PubMed] [Google Scholar]

4. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, Bi J, Zhan G, Xu X, Wang L, Zhou Q, Zhou C, Pan Y, Liu S, Zhang H, Yang J, Zhu B, Hu Y, Hashimoto K, Jia Y, Wang H, Wang R, Liu C, Yang C. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. Brain Behav Immune. 2020 Aug;88:916-9. [PubMed] [Google Scholar]

5. Liang Y, Chen M, Zheng X, Liu J. Screening for Chinese medical staff mental health by SDS and SAS during the outbreak of COVID-19. J Psychosome Res. 2020 Jun;133:110102. [PubMed] [Google Scholar]

6. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res. 2020 Jun;288:112936. [PubMed] [Google Scholar]

7. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, Qin M, Huang H. Work stress among Chinese nurses to support Wuhan for fighting against the COVID-19 epidemic. J Nurs Manag. 2020 Jul;28(5):1002-9. [PubMed] [Google Scholar]

8. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H, Kang L, Yao L, Huang M, Wang H, Wang G, Liu Z, Hu S. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open. 2020 Mar;3(3):e203976. [PubMed] [Google Scholar]

9. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. Brain Behav Immun Health. 2020 Oct;8:100144. [PubMed] [Google Scholar]

10. Cohen S, Williamson G. Perceived stress in a probability sample of the United States In: Spacapam S, Oskamp S, editors. The Social Psychology of Health Newbury Park, CA: Sage; 1988. p. 31-67. [Google Scholar]

11. Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JW, Cheung EP, Chan MT, Wong MM, Tang SW, Choy KM, Wong MK, Chu CM, Tsang KW. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. Can J Psychiatry. 2004 Jun;49(6):391-3. [PubMed] [Google Scholar]

12. Limcaoco RS, Mateos EM, Fernandez JM, Roncero C. Anxiety, worry and perceived stress in the world due to the COVID-19 pandemic, March 2020. Preliminary results. MedRxiv. 2020 Jan 1.[Google Scholar]

13. Nair A, Menon J, Rammohan A, Hakeem AR, Cherukuri SD, Shanmugam N, Rajakumar A, Reddy MS, Kaliamoorthy I, Rela M. Are our COVID warriors cared-for enough? A nationwide survey on stress among doctors during the COVID-19 Pandemic. MedRxiv. 2020 Jan 1. [Google Scholar]

14. Grover S, Sahoo S, Dua D, Mehra A, Nehra R. Psychological impact of COVID-19 duties during lockdown on police personnel and their perception about the behavior of the people: an exploratory study from India. Int J Ment Health Addict. 2020 Nov 5;1-12. [PubMed] [Google Scholar]

15. Halder A, Ghosh A, Mondal N, Desai B, Das P, Maity S. Calling out the COVID blues-how much of a psychological impact does the COVID-19 pandemic have on health care professionals in India. Asian J Med Sci. 2021 May;12(5):7-14. [Google Scholar]

16. Hackett RA, Steptoe A. Type 2 diabetes mellitus and psychological stress - a modifiable risk factor. Nat Rev Endocrinol. 2017 Sep;13(9):547. [PubMed] [Google Scholar]

17. Dimsdale JE. Psychological stress and cardiovascular disease. J Am Coll Cardiol. 2008 Apr;51(13):1237-46. [PubMed] [Google Scholar]

18. Kalache A, Kickbusch I. A global strategy for healthy

Vardhan S et al.
J. Commun. Dis. 2021; 53(4)

14

ageing. World Health. 1997;50(4):4-5. [Google Scholar]

19. WHO [Internet]. COVID-19 Course Series. Real-time training for the coronavirus disease outbreak. [cited 2021 Mar 25] Available from: https://openwho.org/channels/covid-19

20. Lucchini A, Giani M, Elli S, Villa S, Rona R, Foti G. Nursing Activities Score is increased in COVID-19 patients. Intensive Crit Care Nurs. 2020 Aug;59:102876. [PubMed] [Google Scholar]

21. Wu AW, Connors C, Everly Jr GS. COVID-19: peer support and crisis communication strategies to promote institutional resilience. Ann Intern Med. 2020 Jun;172(12):822-3. [PubMed] [Google Scholar]

22. LatestLaws.com [Internet]. COVID-19: Delhi Government orders penal action against landlords harassing health workers to vacate homes; [cited2020 Mar 25]. Available from: https://www.latestlaws.com/latest-news/covid-19-delhi-govt-orders-penal-action-against-landlords-harassing-health-workers-to-vacate-homes/

23. Ramaci T, Barattucci M, Ledda C, Rapisarda V. Social stigma during COVID-19 and its impact on HCWs outcomes. Sustainability. 2020 Jan;12(9):3834. [Google Scholar]