

Original Research Article

# Mental health status of healthcare workers during COVID 19 pandemic and its correlation with fatigue

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**Abstract:** The COVID-19 pandemic has affected both the physical and psychological well-being of those who have been infected or have lost loved ones. Among those most affected are healthcare workers who have been on the frontline throughout the pandemic. This study aims to assess the levels of anxiety and depression among healthcare workers and their association with various demographic parameters. Additionally, we sought to determine the association between the Global Fatigue Index (GFI) and HADS score. Of the participants, 12 (16.22%) had borderline HADS scores (8-10) and 4 (5.41%) had abnormal HADS scores for depression (11-21). Furthermore, 13 (17.57%) had abnormal HADS scores for anxiety. HADS scores for both anxiety and depression were associated with female gender, profession (paramedic staff were more affected than doctors), and income. The GFI was calculated using the Multidimensional Assessment of Fatigue (MAF) score and found to have a positive correlation with various demographic parameters as well as with the HADS score, indicating that psychological stress has an impact on physical well-being and can lead to prolonged fatigue, thereby affecting an individual's working capacity.

**Keywords:** COVID-19; Healthcare workers; Anxiety; Depression; Global fatigue index.

## 1. Introduction

The COVID-19 pandemic has brought unprecedented challenges to the world, affecting not only physical health but also mental health. Many individuals have experienced fear, anxiety, depression, and trauma as a result of the pandemic, with healthcare workers being particularly vulnerable. Healthcare workers have been on the front lines of the battle against COVID-19, facing high levels of stress, long working hours, and a high risk of infection. As a result, many healthcare workers have reported experiencing symptoms of anxiety, depression, and fatigue [1].

To address this issue, several studies have been conducted to explore the psychological impact of the pandemic on healthcare workers. Our study aimed to add to this body of research by assessing the anxiety and depression levels of healthcare workers and examining the association of these levels with various demographic parameters. We also aimed to investigate the relationship between the Global Fatigue Index (GFI) and anxiety and depression levels, as prolonged fatigue can further impact the working capacity of healthcare workers, exacerbating their already high levels of stress [2-4].

Overall, our study provides important insights into the psychological well-being of healthcare workers during the COVID-19 pandemic. The findings highlight the need for targeted interventions to support the mental health of healthcare workers and ensure that they are adequately supported to cope with the ongoing challenges of the pandemic. These interventions could include psychological support services, access to mental health resources, and tailored training and education programs to help healthcare workers better manage stress and fatigue.

## 2. Objectives

1. To evaluate the mental health status of healthcare workers by measuring HADS (hospital anxiety and depression scale).
2. To find association of anxiety and depression with various demographic parameters

3. To assess GFI (Global Fatigue Index) of healthcare workers using MAF score (Multidimensional assessment of fatigue scale) and find its correlation with anxiety depression.

### 3. Methods

A cross sectional survey was conducted among the health care workers of ABVIMS and Dr. Ram Manohar Lohia Hospital from May 2021 to December 2021. A self reporting performa regarding demographic profile, HADS and MAF calculation was given to the healthcare workers after taking an informed consent from them to participate in the study.

#### 3.1. Hospital Anxiety and Depression Scale (HADS)

This scale, developed by Zigmond and Snaith<sup>8</sup> contains a total of 14 items. Seven questions on the scale assess anxiety and other seven assess depression. The scale consists of four-point Likert-type questions, which are filled out by the individuals surveyed. On both the anxiety and the depression subscales, a score of 11 and above indicates a severe condition [2]. The MAF scale contains 16 items and measures four dimensions of fatigue: severity (two items), distress (one item), degree of interference in activities of daily living (11 items) and timing (two items). Respondents are asked to reflect on fatigue patterns during the past one week. Scoring of the MAF results in the Global Fatigue Index (GFI) which ranges 1-50. Higher scores indicate higher levels of fatigue [3]. The inclusion criteria was the healthcare workers (HCWs- doctors/ nurses/ paramedical staff) 18 years and above who have completed the questionnaire.

#### 3.2. Statistical Analysis

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the quantitative data with normal distribution were presented as the means  $\pm$  SD. The following statistical tests were applied for the results:

1. The comparison of the variables which were quantitative in nature were analysed using Independent t test (for two groups) and ANOVA test (for more than two groups).
2. Pearson correlation coefficient was used for correlation of GFI and HADS with age and GFI and HADS.

The final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, ver 21.0. For statistical significance, p value of less than 0.05 was considered statistically significant.

### 4. Results

A total of 100 HCWs participated in the study, 26 were excluded due to incomplete performa and hence, 74 healthcare workers were included in the study. Out of these 49 (66.22%) were females and 25(33.78%) were males. The mean age of the subjects was (35.22 $\pm$ 9.8) years. 57 (77.03%) subjects were residents of Delhi. 27(36.49%) were doctors, 33(44.59%) were Nurses and 14 (18.92%) was paramedical staff. Only 2(2.70%) subjects had past h/o psychiatric illness & 3 (4.05%) had family history of psychiatric illness. The demographic overview of the study population has been given in Table 1.

The mean HADS score for depression in health care workers was 5.01 $\pm$ 3.38. 58 (7.38%) subjects had a normal HADS score of 0-7. 12(16.22%) had a border line HADS score of (8-10) and 4(5.41%) subjects had abnormal HADS score for depression(11-21).

Mean HADS score for anxiety was 6.35 $\pm$ 3.91. 44(59.46%) subjects had normal anxiety score, 17(22.97%) were border line & 13 (17.57%) subjects had abnormal HADS score for anxiety. Mean of Total HADS score was 11.36 $\pm$ 6.74. (Table 2)

We tried to find the correlation of anxiety and depression (HADS) to various demographic parameters. The HADS score for depression was associated with profession. Doctors - (4.04 $\pm$ 3.04), Nurses (4.73 $\pm$ 3.53) others 7.57 $\pm$ 2.38 (p=0.004). It was also associated with income (p=0.016). Similarly HADS score for anxiety was also associated with profession, Doctors (5.56 $\pm$ 3.58), Nurses 5.48 $\pm$ 3.49, others 9.93 $\pm$ 3.67 (p-value 0.0004) and with income (p=0.017). HADS score for anxiety was higher among females & was significantly associated with gender (p=0.017). (Tables 3 & 4)

In our study, the mean GFI among health care workers was  $18.95 \pm 8.72$  (range 0-38-05). GFI calculated by MAF score was found to have statistically significant association with gender ( $p=0.040$ ), profession ( $0.012$ ) income ( $0.031$ ) and vehicle owned ( $0.056$ ). (Table 5)

Further Pearson's correlation co-efficient was calculated to see correlation of total HADS score, anxiety and depression with GFI. There was a positive correlation of all three with GFI with  $p$ -values  $< 0.05$  for total HADS as well as for anxiety and depression. (Table 6), (Figure 1)

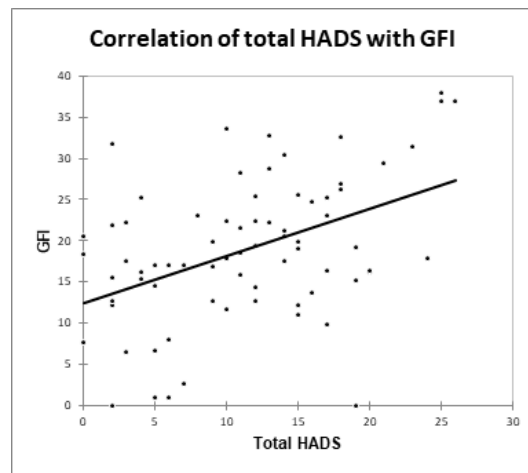


Figure 1. POSITIVE CORRELATION OF TOTAL HADS AND GFI

## 5. Discussion

Covid 19 has emerged as globally challenging disease across the globe. It was declared as a pandemic in March 2020 by WHO [1]. Throughout this pandemic, healthcare workers have been at the forefront in management of covid patients. They themselves have also suffered from the disease and many have lost their near and dear ones. So, covid not only had physical but also psychological impact on health care workers. The reason for such psychological impact could be the excess workload, long work hours, inadequate availability of resources and equipment like PPE, and feeling inadequate support [4]. Our study has shown that subjects had raised anxiety score with 22.97% subjects having borderline score and 17.57% having abnormal score. This finding was similar to the study done in India by Wilson et al which suggested the prevalence estimates of anxiety symptoms (17.7%) requiring additional evaluation and depressive symptoms (11.4%) requiring treatment [5]. Pooled HADS score for anxiety and depression was 21.53% which come out to be similar to the study done by

Pappa S et al which showed that pooled prevalence for anxiety and depression among health care workers during covid 19 were 23.2% and 22.8% respectively [6]. However a study done Rafia Tasnim in Bangladesh showed comparatively higher prevalence of anxiety and depression of 69.5% and 39.5% respectively for less severe symptomology (at least borderline abnormal), and 41.2% and 15.7% for more severe (at least abnormal) symptomology [7]. Another study conducted on Chinese HCWs showed 44.6% subjects with anxiety symptoms and 50.4% with depressive symptoms [8]. However, these studies were conducted during the acute phase of the COVID-19 pandemic, which could account for the increase in anxiety and depressive symptoms in the population.

A study done by Phua D reported a prevalence of 25.3% of psychological morbidity among HCWs at a screening centre during the H1N1 pandemic in Singapore [9]. In another study by Kang L et al, it was found that anxiety, depression and sleep disorder scale scores were significantly higher among physicians and nurses [10]. The three demographic risk factors associated with anxiety and depression in our study were, female gender ( $P=0.017$ ), profession and income. Nurses and paramedical staff had more anxiety. Those HCWs with salary of 10,000-30,000 per month had more anxiety.

HADS score for anxiety and depression showed to be significantly associated with female gender ( $p=0.017$ ) in our study, similar to this study. In a previous study done by Tasnim R et al, the regression analyses with the total HADS score as a dependent variable revealed significant ( $p < 0.05$ ) associations with female gender, moderate and poor health status, infrequent physical exercising, smoking, having had

**Table 1.** Baseline characteristics of study subjects

Baseline characteristics	Frequency	Percentage
Age(years)		
Mean $\pm$ SD	35.22 $\pm$ 9.8	
Median(25th-75th percentile)	32.5(28-40.75)	
Range	24-59	
Gender		
Female	49	66.22%
Male	25	33.78%
Area of residence		
Delhi	57	77.03%
Out of Delhi	17	22.97%
Doctor/nurse/others		
Doctors	27	36.49%
Nurse	33	44.59%
Others	14	18.92%
Past history of depression/Psychiatric illness		
No	72	97.30%
Yes	2	2.70%
Family history of depression/Psychiatric illness		
No	71	95.95%
Yes	3	4.05%
Family structure		
Joint	29	39.19%
Nuclear	45	60.81%
Income(in rupees)		
10000 to 30000 per month	9	12.16%
30000 to 50000 per month	5	6.76%
>50000 per month	60	81.08%
Education		
Graduate	45	60.81%
Post graduate	24	32.43%
Others	5	6.76%
Marital status		
Married	42	56.76%
Unmarried	31	41.89%
Others(divorced/widow)	1	1.35%
Employment		
Contractual	35	47.30%
Permanent	39	52.70%
Accommodation		
Rented	36	48.65%
Self-owned	38	51.35%
Vehicle owned		
Bicycle	12	16.22%
Scooter	27	36.49%
Four wheeler	35	47.30%
Co-morbidities		
Nil	59	79.73%
CAD	1	1.35%
HTN	4	5.41%
Hypothyroid	6	8.11%
Obesity	4	5.41%

**Table 2.** Distribution of HADS and GFI of study subjects

HADS and GFI	Frequency	Percentage
HADS score depression		
0-7{Normal}	58	78.38%
8-10{Borderline abnormal}	12	16.22%
11-21{Abnormal}	4	5.41%
Mean $\pm$ SD	5.01 $\pm$ 3.38	
Median(25th-75th percentile)	5(2-7)	
Range	0-13	
HADS score anxiety		
0-7{Normal}	44	59.46%
8-10{Borderline abnormal}	17	22.97%
11-21{Abnormal}	13	17.57%
Mean $\pm$ SD	6.35 $\pm$ 3.91	
Median(25th-75th percentile)	7(3-9)	
Range	0-17	
Total HADS		
Mean $\pm$ SD	11.36 $\pm$ 6.74	
Median(25th-75th percentile)	12(5.25-16)	
Range	0-26	
GFI		
Mean $\pm$ SD	18.95 $\pm$ 8.72	
Median(25th-75th percentile)	18.45(14.35-24.3)	
Range	0-38.05	

**Table 3.** Association of depression with different parameters

Parameters		Depression	P value
Gender	Female(n=49)	5.47 $\pm$ 3.43	0.105*
	Male(n=25)	4.12 $\pm$ 3.14	
Area of residence	Out of delhi(n=17)	4.59 $\pm$ 3.87	0.558*
	Delhi(n=57)	5.14 $\pm$ 3.24	
Profession	Doctors(n=27)	4.04 $\pm$ 3.04	0.004+
	Nurse(n=33)	4.73 $\pm$ 3.53	
	Others(n=14)	7.57 $\pm$ 2.38	
Past history of depression/psychiatric illness	No past history of depression/psychiatric illness(n=72)	4.89 $\pm$ 3.31	0.056*
	Past history of depression/psychiatric illness(n=2)	9.5 $\pm$ 3.54	
Family history of depression/psychiatric illness	No family history of depression/psychiatric illness(n=71)	5.14 $\pm$ 3.36	0.115*
	Family history of depression/psychiatric illness(n=3)	2 $\pm$ 2.65	
Family structure	Joint(n=29)	4.69 $\pm$ 3.63	0.512*
	Nuclear(n=45)	5.22 $\pm$ 3.23	
Income	10000 to 30000 per month(n=9)	6.67 $\pm$ 3.91	0.016*
	30000 to 50000 per month(n=5)	8.2 $\pm$ 4.44	
	>50000 per month(n=60)	4.5 $\pm$ 3.03	
Education	Graduate(n=45)	4.73 $\pm$ 3.6	0.421
	Post graduate(n=24)	5.17 $\pm$ 2.96	
	Others(n=5)	6.8 $\pm$ 3.27	
Marital status	Married(n=42)	5.38 $\pm$ 3.58	0.231
	Unmarried(n=31)	4.39 $\pm$ 3.02	
	Others (divorced/widow)(n=1)	9 $\pm$ 0	
Employment	Contractual(n=35)	5.46 $\pm$ 3.51	0.288
	Permanent(n=39)	4.62 $\pm$ 3.25	
Accommodation	Rented(n=36)	4.69 $\pm$ 3.58	0.433
	Self owned(n=38)	5.32 $\pm$ 3.2	
Vehicle owned	Bicycle(n=12)	3.92 $\pm$ 2.23	0.463
	Scooter(n=27)	5.11 $\pm$ 3.75	
	Four wheeler(n=35)	5.31 $\pm$ 3.41	
Co-morbidity	No co-morbidity(n=59)	5.02 $\pm$ 3.45	0.901
	CAD(n=1)	6 $\pm$ 0	
	HTN(n=4)	3.5 $\pm$ 3.11	
	Hypothyroid(n=6)	5.5 $\pm$ 2.81	
	Obesity(n=1)	11 $\pm$ 0	

**Table 4.** Association of anxiety with different parameters

Parameters		Anxiety	P value
Gender	Female(n=49)	7.8 ± 3.99	0.017*
	Male(n=25)	5.48 ± 3.68	
Area of residence	Out of delhi(n=17)	6.24 ± 3.78	0.89
	Delhi(n=57)	6.39 ± 3.99	
Profession	Doctors(n=27)	5.56 ± 3.58	0.0004*
	Nurse(n=33)	5.48 ± 3.49	
	Others(n=14)	9.93 ± 3.67	
Past history of depression/psychiatric illness	No past history of depression/psychiatric illness(n=72)	6.28 ± 3.93	0.336
	Past history of depression/psychiatric illness(n=2)	9 ± 2.83	
Family history of depression/psychiatric illness	No family history of depression/psychiatric illness(n=71)	6.52 ± 3.9	0.069
	Family history of depression/psychiatric illness(n=3)	2.33 ± 1.53	
Family structure	Joint(n=29)	6.41 ± 4.63	0.919
	Nuclear(n=45)	6.31 ± 3.44	
Income	10000 to 30000 per month(n=9)	8.89 ± 4.68	0.01*
	30000 to 50000 per month(n=5)	9.2 ± 2.49	
	>50000 per month(n=60)	5.73 ± 3.68	
Education	Graduate(n=45)	5.89 ± 3.79	0.354
	Post graduate(n=24)	6.83 ± 4.18	
	Others(n=5)	8.2 ± 3.7	
Marital status	Married(n=42)	6.57 ± 4.31	0.761
	Unmarried(n=31)	6 ± 3.41	
	Others (divorced/widow)(n=1)	8 ± 0	
Employment	Contractual(n=35)	7.14 ± 3.58	0.1
	Permanent(n=39)	5.64 ± 4.11	
Accommodation	Rented(n=36)	5.44 ± 3.94	0.052*
	Self owned(n=38)	7.21 ± 3.74	
Vehicle owned	Bicycle(n=12)	4.58 ± 3.82	0.213
	Scooter(n=27)	6.44 ± 3.97	
	Four wheeler(n=35)	6.89 ± 3.83	
Co-morbidity	No co-morbidity(n=59)	6.34 ± 4.04	0.811
	CAD(n=1)	10 ± 0	
	HTN(n=4)	5.25 ± 2.63	
	Hypothyroid(n=6)	7.17 ± 4.54	
	Obesity(n=1)	9 ± 0	

**Table 5.** Association of GFI with different parameters

Parameters		GFI	P value
Gender	Female(n=49)	20.01 ± 5.01	0.040*
	Male(n=25)	16.87 ± 7.88	
Area of residence	Out of delhi(n=17)	17.39 ± 10.02	0.406
	Delhi(n=57)	19.41 ± 8.33	
Profession	Doctors(n=27)	18.15 ± 4.4	0.012*
	Nurse(n=33)	20.18 ± 3.8	
	Others(n=14)	22.42 ± 5.3	
Past history of depression/psychiatric illness	No past history of depression/psychiatric illness(n=72)	18.79 ± 8.71	0.365
	Past history of depression/psychiatric illness(n=2)	24.5 ± 9.9	
Family history of depression/psychiatric illness	No family history of depression/psychiatric illness(n=71)	18.96 ± 8.89	0.96
	Family history of depression/psychiatric illness(n=3)	18.7 ± 2.77	
Family structure	Joint(n=29)	17.93 ± 9.98	0.423
	Nuclear(n=45)	19.6 ± 7.84	
Income	10000 to 30000 per month(n=9)	21.05 ± 6.33	0.031*
	30000 to 50000 per month(n=5)	19.1 ± 3.86	
	>50000 per month(n=60)	16.62 ± 4.65	
Education	Graduate(n=45)	18.95 ± 8.1	0.767
	Post graduate(n=24)	19.49 ± 10.51	
	Others(n=5)	16.33 ± 4.35	
Marital status	Married(n=42)	20.22 ± 9.15	0.231
	Unmarried(n=31)	17.02 ± 7.93	
	Others (divorced/widow)(n=1)	25.3 ± 0	
Employment	Contractual(n=35)	18.32 ± 8.38	0.56
	Permanent(n=39)	19.51 ± 9.08	
Accommodation	Rented(n=36)	17.65 ± 9.11	0.217*
	Self owned(n=38)	20.17 ± 8.25	
Vehicle owned	Bicycle(n=12)	15.98 ± 9.63	0.056
	Scooter(n=27)	16.99 ± 7.84	
	Four wheeler(n=35)	21.47 ± 8.57	
Co-morbidity	No co-morbidity(n=59)	19.41 ± 8.9	0.66
	CAD(n=1)	13.7 ± 0	
	HTN(n=4)	20.08 ± 2.22	
	Hypothyroid(n=6)	14.09 ± 12.04	
	Obesity(n=1)	16.22 ± 0	

**Table 6.** Correlation of GFI and HADS

Variables	Total HADS	Depression	Anxiety
GFI			
Correlation coefficient	0.440	0.406	0.407
P value	0.0001*	0.0003*	0.0003*

regrets about one's profession because of the pandemic and associated experiences, not updating on the latest COVID-19-related research, experiencing discrimination in the workplace, and facing social problems due to working in a lab or hospital during the COVID-19 pandemic [7].

Females were more likely to experience anxiety and depression, as per another study conducted in Bangladesh during the COVID-19 pandemic [11]. A study by Gupta et al also showed female gender, young age group (20-35 years), unmarried status and job profile of nurses as a demographic risk factor for anxiety. The protective factor was HCWs having service for more than 20 years. The risk factor for anxiety among female HCWs was 1.8 times higher than among male HCWs [12].

A longitudinal survey conducted in India reported that prevalence of anxiety symptoms is more (21.7%) in female gender than in male gender (16.2%) [13].

Our study did not show any relation of anxiety and depression to the educational status but a study done by Cheng C et al showed an inverse relationship between education and anxiety symptoms (bachelor's degree: OR  $\frac{1}{4}$  0.62,  $p\frac{1}{4}$  0.04; master's degree: OR  $\frac{1}{4}$  0.63,  $p\frac{1}{4}$  0.02). Moreover, HCWs having a service of more than 20 years reported fewer anxiety symptoms. This is probably attributable to their knowledge, experience and maturity [14]. A prior study conducted among Chinese medical staff during the COVID-19 pandemic reported that anxiety was more frequently observed in females relative to males [15].

Studies have shown that attention and decision-making mechanisms are affected in situations of psychiatric disorders, such as anxiety disorder and depressive disorder. Moreover, it has also been reported that stress has negative effects on attention [16,17].

The other factors found to be associated with anxiety in the previous studies done by Gong Y et al and Hasan MZ et al were discrimination in their workplace and shortages of PPE and fear of being infected by the virus, and transmitting to family members [18,19]. The present study revealed that anxiety and depression were strongly associated with each other ( $r = 0.64$ ) similar to the study done by Kalin NH [20].

In addition we studied the global fatigue index by MAF score. The mean GFI among health care workers was  $18.95 \pm 8.72$  (range 0-38-05). GFI calculated by MAF score was found to have statistically significant association with gender ( $p=0.040$ ), profession (0.012), income (0.031) and vehicle owned (0.056). Total HADS score and GFI were found to have positive correlation. Although MAF score is not used to evaluate fatigue in normal population but it had been used to assess fatigue and its association with various disease scores and outcomes.

A study done by Enns W et al evaluated the association between pain, fatigue, depression, anxiety and work impairment in four patient populations: multiple sclerosis, inflammatory bowel disease, rheumatoid arthritis and a depression and anxiety group. Each of pain, depression symptoms, anxiety symptoms, and fatigue individually showed significant associations with work absenteeism, presentism, and general activity impairment. Fatigue was a significant predictor of work and activity impairment in all models. These findings had important clinical implications for understanding the determinants of work impairment and for improving work-related outcomes in chronic disease [21].

Another study done on rheumatoid arthritis patients showed that the median MAF total score was higher in patients with RA (38.5, min-max: 4-50) than in control subjects (22.5, min-max: 0-42) ( $p < 0.001$ ). Fatigue was essentially found to be related with disease activity rather than the chronic inflammatory process in RA [22].

BS patients had significantly higher MAF, HADS-depression (HADS-D) and HADS-anxiety (HADS-A) scores than the healthy controls ( $P < 0.001$ ). Both the physical and mental components of the SF-36 scale were impaired in BS patients ( $P = 0.0001$ ). Fatigue was common in clinically active BS patients compared with healthy controls and inactive BS patients. Depression, anxiety and physical dysfunction were significantly associated with fatigue [23]. The relative association between fatigue and need for recovery with anxiety, depression and combined anxiety-depression, were compared in a sample of 400 students at an Australian university. Results showed that fatigue had a stronger association with anxiety and depression than did need for recovery [24].

## 6. Conclusion

Increased incidence of anxiety and depression was found in health care workers (more so in female HCWs) attending COVID patients. This had led to fatigue that might have impacted their work capacity. Appropriate



steps should be taken to reduce the psychological stress among HCWs either by decreasing the chances of infections, shorter shift lengths, and mechanisms for mental health support.

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