# A Study to Evaluate Depression and Perceived Stress Among Frontline Indian Doctors Combating the COVID-19 Pandemic

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## ABSTRACT

***Objective:*** Amid the ongoing coronavirus disease 2019 (COVID-19) pandemic, health care workers of multiple disciplines have been designated as frontline doctors. This unforeseen situation has led to psychological problems among these health care workers. The objective of this study was to evaluate the mental health status of pan-Indian frontline doctors combating the COVID-19 pandemic.

***Methods:*** A cross-sectional, observational study was conducted among frontline doctors of tertiary care hospitals in India (East: Kolkata, West Bengal; North: New Delhi; West: Nagpur, Maharashtra; and South: Thiruvananthapuram, Kerala) from May 23, 2020, to June 6, 2020. Doctors involved in clinical services in outpatient departments, designated COVID-19 wards, screening blocks, fever clinics, and intensive care units completed an online questionnaire. The 9-item Patient Health Questionnaire and the Perceived Stress Scale were used to assess depression and perceived stress.

***Results:*** The results of 422 responses revealed a 63.5% and 45% prevalence of symptoms of depression and stress, respectively, among frontline COVID-19 doctors. Postgraduate trainees constituted the majority (45.5%) of the respondents. Moderately severe and severe depression was noted in 14.2% and 3.8% of the doctors, respectively. Moderate and severe stress was noted in 37.4% and 7.6% of participants, respectively. Multivariate regression analysis showed working ≥ 6 hours/day (adjusted odds ratio: 3.5; 95% CI, 1.9–6.3; $P < .0001$) to be a significant risk factor for moderate or severe perceived stress, while single relationship status (adjusted odds ratio: 2.9; 95% CI, 1.5–5.9; $P = .002$) and working ≥ 6 hours/day (adjusted odds ratio: 10.3; 95% CI, 4.3–24.6; $P < .0001$) significantly contributed to the development of moderate, moderately severe, or severe depression.

***Conclusions:*** The pandemic has taken a serious toll on the physical and mental health of doctors, as evident from our study. Regular screening of medical personnel involved in the diagnosis and treatment of patients with COVID-19 should be conducted to evaluate for stress, anxiety, and depression.

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The world has encountered 3 major infectious episodes caused by coronavirus in the past 2 decades, namely severe acute respiratory syndrome in 2003, Middle Eastern respiratory syndrome in 2012, and coronavirus disease in 2019 (COVID-19). COVID-19 emerged from Wuhan, China in December 2019 and rapidly spread to other parts of the world.[1] Health facilities were not well prepared for such a sudden surge of a novel virus, and the burden of the pandemic has tested an already tenuous infrastructure. Health care workers have been entrusted with the responsibility of managing patients with COVID-19, from screening, clinical sample collection (nasopharyngeal swabbing), and admissions to ward rounds, intubations, and performing life resuscitating procedures.[2] Health care workers from different branches of medicine have joined hands to work together as frontline doctors. This display of selfless devotion has even earned them the title of "frontline warrior." The present situation has caused serious psychological issues among these health care workers, given that COVID-19 is highly infectious even before the appearance of signs and symptoms, the lack of sufficient testing kits, the unprepared health infrastructure, the unexpected course of events in the natural history of the disease, and the lack of scientifically proven treatment strategies.[3] Fear, stress, anxiety, and depression are some of the commonly encountered symptoms among frontline doctors battling the pandemic.[4] Moreover, these symptoms affect their work output, which impacts health care delivery as a whole.

In this study, we evaluated the mental health status of pan-Indian frontline doctors combating the COVID-19 pandemic. To our knowledge, this is the largest group of doctors (frontline only) to have their psychological status assessed amid this crisis to date.

## METHODS

This cross-sectional, observational study was carried out with doctors in India (East: Kolkata, West Bengal; North: New Delhi; West: Nagpur, Maharashtra; and South: Thiruvananthapuram,

**Clinical Points**

- The COVID-19 pandemic has taken a serious toll on the mental health of clinicians, with a high prevalence of depression and stress among doctors actively engaged in COVID care.
- Screening, recognition, and treatment of the unmet psychological needs of frontline doctors treating patients with COVID-19 should be addressed.

Kerala). Doctors involved in clinical services in outpatient departments, designated COVID-19 wards, screening blocks, fever clinics, and intensive care units were considered frontline physicians and were included in the study. India, as of May 23, 2020, the date of commencement of the study, was experiencing a "cluster of cases" per a World Health Organization report.[5] Thus, these health care personnel were included in the frontline/direct group (ie, involved in direct patient contact irrespective of personal protective equipment [PPE]), while those involved in administrative and other departmental duties were excluded.

An online semistructured questionnaire was prepared on the Google forms platform, and the link was circulated among doctors through e-mail, WhatsApp messenger, Facebook messenger, Telegram, and other social media via contacts of the investigators (snowball sampling). The questionnaire was active from May 23, 2020 at 10:00 AM to June 6, 2020 at 10:00 AM. After receiving and clicking the link, the participant was auto directed to information about the study and informed consent. Next, a set of questions appeared sequentially. The questionnaire, restricted to a single response from each participant, comprised 3 sections. The first section consisted of demographic details, which included the independent variables of age, sex, comorbidities, relationship status, designation (eg, intern/house staff, postgraduate trainee, senior resident, consultant), working hours, duration of time working in the health care sector, whether they were working in COVID-19–positive wards, and current residence. These questions were followed by an assessment of dependent variables of depression and perceived stress. The second section consisted of the 9-item Patient Health Questionnaire (PHQ-9),[6] a depression module that scores each of the 9 *DSM-IV* criteria (0–4: minimal, 5–9: mild, 10–14: moderate, 15–19: moderately severe, 20–27: severe depression). The third section comprised the Perceived Stress Scale (PSS),[7] which is the most widely used psychological instrument for measuring the perception of stress (0–13: low, 14–26: moderate, 27–40: severe stress).

It took approximately 3 minutes for participants to complete the questionnaire. Forms with incomplete responses were not considered. Confidentiality and anonymity were strictly maintained. Data were entered into Excel data sheets (Microsoft Excel, 2013). Descriptive data were analyzed on the parameters of range, mean ± SD, and frequencies. Continuous variables were analyzed using unpaired *t* test/Mann-Whitney U test and categorical data by Fisher exact test/$\chi^2$ test. The statistical software Medcalc version 10.2.0.0 for Windows vista was used. Significant predictors were further analyzed using multivariate logistic regression.

## RESULTS

Of 449 responses, 27 were excluded on the basis of inclusion/exclusion criteria. The demographics of the study participants showed a slight male distribution (55.5%). The mean ± SD age of the study population was 27.61 ± 4.98 years, with 218 (51.6%) in the age bracket of 25–29 years. The majority (90.5%) of respondents were from clinical branches of medicine: 188 postgraduate trainees (45.5%), 126 (29.9%) interns/house staff, 75 (17.8%) senior residents, and 33 (7.8%) consultants. Most were either single (50.2%) or involved in a relationship (26.1%). In the study sample, 187 (44.3%) were engaged in duties within COVID-positive wards and 143 (33.9%) in screening at fever clinics; 270 (64%) had been staying away from their families. Comorbidities were recorded for 16 (3.8%) respondents, of whom 13 were consultants.

In the study population, 268 (63.5%) doctors were depressed, among whom 154 (36.5%) had mild depression. Moderate, moderately severe, and severe depression were encountered in 76 (26%), 30 (14.2%), and 8 (3.8%) respondents, respectively. The mean ± SD PHQ-9 depression score was 7.86 ± 4.04. Among the 38 participants with moderately severe to severe depression, a significant association ($P < .05$) was found with female sex ($P < .001$) and designation as a postgraduate trainee ($P = .011$).

Of the 422 participants, stress was depicted in 190 (45%), of whom stress levels were moderate in 158 (37.4%) and severe in 32 (7.6%). The mean ± SD PSS score was 20.14 ± 5.23. Higher PSS scores were seen in women, those who were single, interns/house staff, those working in COVID-19–positive wards and fever clinics, those working longer hours (≥ 6 hours/day), those staying with family, and those with underlying comorbidities. A statistically significant association was found between perceived stress and female sex, designation (postgraduate trainees), work hours ≥ 6 hours/day, and staying with family due to potential risk of transmission to family members.

The multivariate logistic regression model showed working ≥ 6 hours/day (adjusted odds ratio [AOR]: 3.5; 95% CI, 1.9–6.3; $P < .0001$) to be a significant risk factor for moderate or severe perceived stress (PSS score > 13), while single relationship status (AOR: 2.9; 95% CI, 1.5–5.9; $P = .002$) and working ≥ 6 hours/day (AOR: 10.3; 95% CI, 4.3–24.6; $P < .0001$) significantly contributed to the development of moderate, moderately severe, or severe depression (PHQ score > 9). The results are summarized in Table 1.

## DISCUSSION

Our results revealed a 63.5% and 45% prevalence of symptoms of depression and stress, respectively, among

**Table 1. Results of the Multivariate Logistic Regression Model[a]**

| Variable | Total Respondents (N = 422) | Depression (moderately severe and severe, PHQ-9 score > 14) (n = 38) | Stress (moderate and severe, PSS score > 13) (n = 190) |
|---|---|---|---|
| Age, y | | *P* = .379 | *P* = .852 |
| < 25 | 118 (27.9) | 7 (18) | 61 (32) |
| 25–29 | 218 (51.7) | 22 (58) | 94 (49) |
| 30–34 | 60 (14.2) | 4 (10) | 21 (11) |
| 35–39 | 18 (4.2) | 3 (8) | 9 (5) |
| 40–44 | 2 (0.5) | 1 (3) | 2 (1) |
| 45–49 | 2 (0.5) | 0 | 1 (1) |
| ≥ 50 | 4 (1.0) | 1 (3) | 2 (1) |
| Sex | | *P* < .001* | *P* = .028* |
| Male | 224 (55.5) | 5 (13) | 85 (45) |
| Female | 188 (44.5) | 33 (87) | 105 (55) |
| Comorbidities | | *P* = .224 | *P* = .278 |
| Present | 16 (3.8) | 3 (8) | 4 (2) |
| Absent | 406 (96.2) | 35 (92) | 186 (98) |
| Relationship status | | *P* = .082 | *P* < .001* |
| Single | 212 (50.2) | 31 (82) | 152 (80) |
| In a relationship | 110 (26.1) | 3 (8) | 21 (11) |
| Married | 98 (23.2) | 4 (10) | 16 (8) |
| Divorced | 2 (0.6) | 0 | 1 (1) |
| Designation | | *P* = .011* | *P* < .001* |
| Intern/house staff | 126 (29.9) | 2 (5) | 96 (51) |
| Postgraduate trainee | 188 (44.5) | 23 (61) | 71 (37) |
| Senior resident | 75 (17.8) | 7 (18) | 18 (9) |
| Consultant | 33 (7.8) | 6 (16) | 5 (3) |
| Work hours/day | | *P* < .001* | *P* < .001* |
| < 6 | 173 (41.0) | 6 (2) | 62 (32) |
| 6–12 | 226 (53.5) | 28 (8) | 119 (63) |
| > 12 | 23 (5.5) | 4 (10) | 9 (5) |
| Currently working in | | *P* = .649 | *P* = .236 |
| Outpatient department | 59 (14.0) | 8 (21) | 17 (9) |
| Fever clinic | 143 (33.9) | 13 (34) | 71 (37) |
| Designated COVID-19 ward | 187 (44.3) | 14 (37) | 91 (48) |
| Intensive care unit | 33 (7.8) | 3 (8) | 11 (6) |
| Currently staying | | *P* = .919 | *P* = .008* |
| With family | 152 (36.0) | 14 (37) | 100 (53) |
| Away from family | 270 (64.0) | 24 (63) | 90 (47) |

[a]Data are presented as n (%).
*Indicates statistical significance.
Abbreviations: COVID-19 = coronavirus disease 2019, PHQ-9 = 9-item Patient Health Questionnaire, PSS = Perceived Stress Scale.

doctors on the frontline treating COVID-19 patients. Longer working hours and residing away from family were significantly correlated with perceived stress and depression in the multivariate logistic regression model. A multicenter survey[8] involving 1,563 Chinese medical staff revealed depression in 50.7% and stress-related symptoms in 73.4%. Zhang et al[1] reported depression in 12.2% of health care workers (n = 927). Results of a recently published study[9] from Wuhan, China, where the outbreak originated, suggested that half of the 1,257 health workers who participated in the study reported symptoms of depression. Among participants who reported experiencing higher psychological burden, statistically significant determinants included nurses, female sex, those living or working in Wuhan, and frontline health care workers directly engaged in the diagnosis, treatment, and care of patients with COVID-19. In April 2020, in a study[10] of 500 health care workers from Singapore, 14.5%, 8.9%, and 6.6% participants screened positive for anxiety, depression, and stress, respectively. Severe symptoms of stress were found in 2.2%–14.5% of all participants in 1 study.[11] In a country such as India, more psychiatric morbidity is expected, which is reflected in our study. In an Indian study[12] involving 152 doctors, 34.9% were found to be depressed and 32.9% were experiencing stress. Significant predictors for psychiatric morbidities included experience in the health care sector, work hours, use of protective measures, and altruistic coping. Multivariable logistic regression showed most of the factors to be significantly associated with depression, anxiety, and stress level.[12] This study[12] was conducted during the early phase of the pandemic and involved doctors from a single Indian state (West Bengal) irrespective of their engagement in COVID-19 patient care, and only 2.6% of the doctors had treated a COVID-19–positive patient. Results of another recent Indian study,[13] which included only frontline dermatologists, revealed a 26.8% and 29.2% prevalence of symptoms of depression and stress, respectively. Interestingly, a previous study[14] addressing the prevalence of depression among doctors during the Middle East respiratory syndrome outbreak reported a much lower rate of 26.6%.

A recent publication[15] from China explored and compared the psychosocial health problems of medical and nonmedical health care workers. Compared with nonmedical health care workers, the medical health care workers had a higher prevalence of insomnia, anxiety, depression, somatization, and obsessive-compulsive symptoms.[15] Challenges included lack of leisure activities, enforced restricted movements within health care establishments, separation from family and loved ones, lack of social interaction, strained relationships between couples due to the emotional and physical distance of the frontline worker spouse, isolation of children at home, and lack of homemade food. Unlike some who have reported positive effects of lockdown such as increased family time with children and parents, the situation for frontline health care workers and their children is much different and stressful.[16] Children get less time with parents working on the frontline and are often quarantined away from them. Children may not understand the lack of interaction with parents, and, in turn, the mental health of the frontline worker may be affected. Constant risk of exposure while caring for patients suspected to have COVID-19 or who are positive is an obvious stressor for both health care workers and their families. According to a Singapore-based study,[17] close to 87% of people are worried about the health of these frontline workers. Urooj et al[18] found that 79.7% of doctors are afraid of infecting family members and 28.8% are afraid of becoming a carrier to others.

Similar to our findings, Lai et al[9] found that female sex and possessing an intermediate professional title were associated with higher anxiety, depression, and distress. Liang et al[19] reported that younger medical staff (age < 30 years) had higher self-rated

depression scores (statistically insignificant) than those who were older (age ≥ 30 years). Older staff can suffer from increased stress and depressive symptoms due to exhaustion from prolonged work hours and concerns for their families and personal safety.[20]

Future career uncertainties and upcoming postgraduate entrance examinations may amplify the underlying stress among intern/house staff doctors. Postgraduate trainees have been entrusted with much of the work at medical facilities during the pandemic. Many of the frontline postgraduate trainees were in the process of completing final examinations, which were abruptly delayed for an indefinite period. Inability to practice in their specialty of choice due to COVID-19–related duties may cause frustration. Online classes are being held in some medical institutions, but teachers and postgraduate trainees who are used to conventional teaching methods are finding the new virtual format difficult.[21] Disturbed sleep time and schedules due to rotational duties exhaust these trainees both physically and mentally. Greater depressive symptoms among postgraduates can be explained by unaddressed burnout issues among residents and postgraduate trainees that eventually evolve into depression.[22,23]

Single doctors are at higher risk than their married counterparts for developing psychiatric symptoms.[24] Podder et al[25] conducted a comparative study between dermatologists and nondermatologists and found higher stress among women and unmarried doctors. But, the study was conducted during the early phase of the national lockdown (April 3–10, 2020) before the large-scale engagement of frontline doctors in COVID-19–related patient care. However, no such conclusion could be drawn from our study, which was conducted during the peak of the pandemic.

Doctors staying in residential housing or as tenants have faced harassment by neighbors or landlords out of ignorance or anxiety during the COVID-19 crisis. During this pandemic, the US Centers for Disease Control and Prevention identified health care professionals as a group that may be at risk of being stigmatized.[26] Such stigmatization and discrimination has been displayed due to fear of the spread of COVID-19 by frontline workers. Even at times when health care workers are not at risk of spreading the disease (ie, after the quarantine period), they have faced discrimination, which has led to stress and depression.

The financial burden has increased for health care workers as well due to the global economic slowdown, lack of funds within hospitals, delayed salaries, and indefinite periods of shut down of private practice. Also, consultants, who have to pay rent for their space as well as full/partial salaries to assistants in spite of closed clinics, have not fared well financially. The physical discomfort and occupational dermatoses associated with the use of PPE have also been shown to be related to greater levels of stress and anxiety symptoms.[27]

Like others, off-duty frontline workers spend their free time on social platforms to connect with society. Unfortunately, chaos and fake news related to COVID-19 are rampant on social media sites (eg, WhatsApp, Twitter, Facebook), which sometimes tempts health care workers to enter into virtual discussions with no worthwhile outcome.[28]

Practicing new methods of a discipline different than what he/she has mastered over the years, long hours of working in extreme conditions under PPE kit discomfort, long duty hours with no food/water/urination allowed during the time of duty with PPE, and irritation and physical strain in PPE during the summer season have been constant precipitators of stress and depression among the doctors of all the disciplines working as frontline warriors. With a scarcity of resources and an ever increasing number of patients, life-saving decisions have to be made. Making such decisions amid intense work pressure leads to added stress within emergency departments as well as during after-duty hours.[29] All doctors are susceptible to developing higher stress irrespective of their discipline during the COVID-19 pandemic,[25] and this is further precipitated by their quarantined living conditions.

### Limitations

A more convincing conclusion could have been drawn if we had compared the study population with doctors who were working in hospitals but not in direct contact with patients. Moreover, assessment of posttraumatic stress disorder (via the Impact of Event Scale With Modifications for COVID-19[30]) would have added another dimension to the psychological profile. Moreover, selection bias (only those with smartphones/computers could participate in our online survey) could not be avoided.

## CONCLUSION

During the COVID-19 pandemic, the focus continues to remain on the biological and physical domains of the population, neglecting the unmet psychological needs of the frontline doctors engaged in care of these patients. Constant presence of stressors continuously test the resilience of health care workers and will remain a challenge in the future.[31] Regular screening to evaluate stress, anxiety, and depression among medical personnel involved in the diagnosis and treatment of patients with COVID-19 should be implemented.

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