

# Psychological Morbidity Among Post-COVID-19 Patients: A Cross-sectional Study from Chennai, South India

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## ABSTRACT

**Background:** The COVID-19 pandemic is a global health threat and is by far the largest outbreak of atypical pneumonia, since the SARS outbreak in 2003. A range of psychiatric morbidities such as persistent depression, anxiety, panic attacks, delirium and suicidality were observed in the post infectious state across the world. Hence, the aim of the study was to understand the psychological status of the patients affected by COVID during their post-COVID follow-up period and to examine the socio-demographic and clinical factors associated with high psychological morbidity.

**Materials and Methods:** A cross sectional study conducted in the post-COVID follow up clinic, at a tertiary care hospital between the months of August - November 2020, using a semi structured proforma and rating scales such as Patient Health Questionnaire-9 (PHQ-9), Hospital Anxiety and Depression Scale (HADS) and Insomnia Severity Index (ISI) for depression, anxiety and insomnia, respectively.

**Results:** The study results indicate that the prevalence of depression and anxiety among post-COVID-19 patients was 21.9% and 11.9%, respectively. Insomnia was observed among 21.7%. Among various socio-demographic and clinical variables examined, it was observed that female gender, patients with ongoing stressors and patients with post-COVID-19 persistent physical symptoms were found to be associated with greater depression and anxiety among the study population.

**Conclusions:** Persistent physical symptoms and ongoing life stressors are found to be associated

with depression and anxiety among post-COVID-19 patients. Hence, periodic screening for individuals with persisting physical symptoms and care for the vulnerable population such as those with ongoing stressors will provide a significant advantage in the follow up of the mental health of the patients affected with COVID-19.

**Keywords:** Post-COVID state, psychological morbidity, depression, anxiety, insomnia, post viral illness

**Running Title:** Psychological morbidity in post-COVID patients

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## INTRODUCTION

The COVID-19 pandemic is a global health threat and is by far the largest outbreak of atypical pneumonia, since the SARS outbreak in 2003.<sup>1</sup> On 30th January 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency of international concern.<sup>2</sup> Symptoms of COVID-19 include fever, chills, cough, nausea, coryza, sore throat, myalgia, nausea and breathing difficulty at varying proportions.<sup>3</sup>

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Other than the physical symptoms, patients with COVID-19 also present with psychological symptoms.<sup>4</sup> The psychological symptoms of COVID-19 include a range of psychiatric morbidities such as depression, anxiety, panic attacks, delirium and suicidality.<sup>5</sup> Studies analyzing the psychological impact of COVID-19 infection among the people infected with the illness across the world indicates moderate levels of depression and anxiety.<sup>6</sup> In India, studies assessing the psychological impact of the COVID-19 pandemic are increasing.<sup>7-11</sup> These studies assessed the psychological impact in different clinical scenarios ranging from during quarantine/isolation, follow-up visits and among high-risk population such as frontline workers.

Even though many studies have examined the psychological impact of COVID-19 among patients affected, very few studies have assessed the psychological morbidity of these patients during the post-COVID-19 follow-up period.<sup>12, 13</sup> It is important to understand the long-term impact of COVID-19 on the psychological wellbeing of the patients affected by COVID-19 and to provide the needed psychological help during the follow-up for better outcomes.<sup>14</sup> Hence, the aim of the study was to understand the psychological morbidity among patients affected by COVID-19 during their post-COVID-19 follow-up period and to examine the socio-demographic and clinical factors associated with high psychological morbidity.

## MATERIALS AND METHODS

*Study site:* The study was conducted in the COVID follow-up clinic at a large tertiary care hospital in Chennai, Tamil Nadu. This center is one of the largest hospitals dedicated to the management of COVID-19 in Tamil Nadu. The study was conducted between August – November 2020. Prior ethical approval was obtained before the start of the study.

*Participants:* All the previous COVID positive patients (recovered patients) attending the follow-up clinic after one-month post-recovery were approached and included into the study after informed consent. Participants were recruited into the study in a consecutive sampling method. No specific inclusion and exclusion criteria were applied for the recruitment into the study other than not willing to provide an informed consent. Persons with pre-existing psychological symptoms or mental disorders were not excluded from the study.

### Tools used

*Sociodemographic details:* A semi-structured proforma was developed to capture the basic sociodemographic profile of the participants including age, gender etc. and the clinical severity of the COVID infection, including duration of hospital stay, need for intubation and others.

*Anxiety symptoms:* Hospital Anxiety and depression scale (HADS) was used to assess the anxiety symptoms among the participants. The HADS is a self-rating scale first described in 1983 by Zigmond and Snaith.<sup>15</sup> It includes seven statements for anxiety and each response consists of a four-point rating scale (0 to 3); a higher score depicts a worse condition. For each subscale the total score is at most 21. A score of  $\geq 11$  is considered a clinically significant disorder, whereas a score between 8 and 10 suggests a mild disorder.

*Depression:* Presence of depression was screened using Patient Health Questionnaire (PHQ) -- 9.<sup>16</sup> The Patient Health Questionnaire (PHQ) is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as “0” (not at all) to “3” (nearly every day). Major depression is diagnosed if 5 or more of the 9 depressive symptom criteria have been present at least “more than half the days” in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia.

*Insomnia symptoms:* Insomnia severity index (ISI) was used to assess the insomnia among the study participants.<sup>17</sup> The ISI is a 7-item self-report questionnaire assessing the nature, severity, and impact of insomnia. The usual recall period is the “last month” and the dimensions evaluated are: severity of sleep onset, sleep maintenance, and early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, noticeability of sleep problems by others, and distress caused by the sleep difficulties. A 5-point Likert scale is used to rate each item (e.g., 0 = no problem; 4 = very severe problem), yielding a total score ranging from 0 to 28. The total score is interpreted as follows: absence of insomnia (0–7); sub-threshold insomnia (8–14); moderate insomnia (15–21); and severe insomnia.

*Data analysis:* All the statistical analysis was performed using SPSS 20.0. For descriptive statistics, continuous variables were represented as mean and standard

deviation and the categorical variables were represented as frequency and percentage. Chi-square test was used to examine association between categorical variables. A p-value of <0.05 was set as significant.

## RESULTS

### *Socio-demographic profile of the study participants*

A total of 534 people participated in the study. 73 individuals belonged to the age group less than 30

years, 374 to the 30-60 years and 87 to the more than 60 years group. Among the 534 persons participated in the study, 342 were males and 192 were females. The total study population was divided into the upper, upper middle, lower middle, upper lower and lower classes based on their socioeconomic status. 134 persons belonged to the upper and upper middle classes, 217 to the lower middle and 183 to the upper lower and lower classes (**Table 1**).

**Table 1: Socio-demographic profile of the study participants (N = 534)**

Variables	Categories	Frequencies	Percentage
Age	< 30 years	73	13.67
	30-60 years	374	70.37
	>60 years	87	16.29
Gender	Male	342	64.06
	Female	192	35.96
Education	Professional or honours, Graduate, Intermediate or Diploma	343	64.23
	High school certificate, Middle school certificate, Primary school certificate, Illiterate	191	35.77
Occupation	Legislators, Senior officials and managers, Professionals, Technical and associated professionals, Clerks	218	40.08
	Skilled workers, Shop and market sales workers, Skilled agricultural & fishery workers, Crafts and related trade workers, Plant and machine operators and assemblers, Elementary occupations	239	43.82
	Unemployed	77	14.42
Socio economic status	Upper, Upper middle	134	25.09
	Lower middle	217	40.63
	Upper lower, Lower	183	34.27

### *Clinical profile of the study participants*

Among the study population, 21 of them were admitted to the intensive care unit during their course of illness, 42 needed oxygen and 18 had witnessed the death of a contact / relative owing to the illness. 258 persons had other co-morbid conditions such as diabetes mellitus, hypertension, ischemic heart disease and COPD. 160 of the 534 patients had ongoing stressors such as financial instability, family conflicts, unemployment etc. (**Table 2**)

**Table 2: Clinical profile of the study participants (N = 534)**

Variables	Categories	Frequencies	Percentage
Course of hospital stay	Uneventful	515	96.442
	Eventful	18	3.371
	Missing	1	0.187
ICU Admission	Present	21	3.93
	Absent	513	96.07
O2 Requirement	Needed	42	7.87
	Not Needed	492	92.14
Comorbidities	Absent	281	52.62
	Present	253	47.38
Past mental illness	Absent	352	65.92
	Present	182	34.08
Death of a contact relative	No	516	96.63
	Yes	18	3.37

#### *Psychological morbidity among the study participants*

The study results indicate that the prevalence of depression and anxiety among post-COVID-19 patients was 21.9% and 11.9%, respectively. Insomnia was observed among 21.7% of the study participants. (**Table 3**)

**Table 3: Psychological morbidity among the study participants (N = 534)**

Variable	Frequency	Percentage
Depression	117	21.91
Anxiety	64	11.98
Insomnia	116	21.72

#### *Factors associated with depression and anxiety among the study participants*

The factors associated with depression and anxiety among the post-COVID-19 patients were female gender ( $P=0.007$ ), ongoing stressors ( $p<0.001$ ) and persisting physical symptoms following the viral illness ( $p<0.001$ ). (**Table 4**)

**Table 4: Association between significant variables and depression and anxiety**

Variable	Anxiety		p-value	Depression		p-value
	No	Yes		No	Yes	
<b>Gender</b>						
Male	223 (64.82%)	8 (40%)	0.025	207 (65.71%)	24 (48.98%)	0.024
Female	121 (35.18%)	12 (60%)		108 (34.28%)	25 (51.02%)	
<b>Ongoing Stressors</b>						
No	274 (79.65%)	9 (45%)	< 0.001	266 (87.5%)	17 (28.33%)	< 0.001
Yes	70 (20.34%)	11 (55%)		38 (12.5%)	43 (71.66%)	
<b>Persisting Physical Symptoms</b>						
No	292 (84.88%)	14 (70%)	0.07	261 (85.85%)	45 (75%)	0.036
Yes	52 (15.11%)	6 (30%)		43 (14.14%)	15 (25%)	

## DISCUSSION

The aim of the study was to assess the prevalence of depression and anxiety among post-COVID-19 patients visiting a tertiary care center for review and to examine the factors associated with depression and anxiety among them.

The study results indicate that the prevalence of depression and anxiety among post-COVID-19 patients was 21.9% and 11.9%, respectively. Insomnia was observed among 21.7%. In a study conducted among the Fangcang shelter hospitals established in China, during the COVID virus pandemic 18.6% experienced anxiety symptoms, 13.4 % experienced depression and 84.7% had poor sleep quality.<sup>18</sup> The three most current physical symptoms experienced were coughing (26.4%), shortness of breath (24.4%) and soreness or discomfort in throat in (17.9%). Among the patients we studied, the three most common physical symptoms were sleep disturbances, cough and myalgia. These findings are similar to the findings obtained in our study. Also, studies indicate impact of the pandemic was more on women and young adults compared to others.<sup>19, 20</sup>

Among various socio-demographic and clinical variables examined, it was observed that female gender, patients with ongoing stressors and patients with post-COVID-19 persistent physical symptoms were found to

be associated with depression and anxiety among the study population. In this study, women were observed to suffer more from insomnia and anxiety when compared with males. These findings are similar to the previous studies where females showed higher psychological distress scores.<sup>21-23</sup> These findings were also echoed in a Nationwide survey of psychological distress among Chinese people in the COVID 19 epidemic.<sup>24</sup> Response and responsiveness to stress appear to be different by gender. Female sex hormones attenuate the sympathetic-adrenal and HPA responsiveness. This leads to sluggish control feedback on the brain and less or delayed containment of the response among women.<sup>25</sup> In addition to this, their role as the main caregiver in the family, being responsible for the household tasks and care for the children makes them vulnerable for the anxiety and insomnia symptoms.

Nearly one third of patients had ongoing stressors in the current study. These various stressors are financial instability, family conflicts and presence of chronic illnesses. These patients had higher levels of depression compared to the other two thirds of patients. In a study from the UK, many people entered the COVID-19 pandemic from positions of disadvantage. Certain population groups in the society already had a higher risk of experiencing poor mental health and wellbeing than people from more advantaged positions and they had significant impact owing to their pre-existing

vulnerable state.<sup>26</sup> Similarly, our study population who have been facing ongoing stressors had significant levels of depression.

Nearly 50% of the study participants had continuous physical symptoms in the post-COVID-19 period. The most common post-COVID-19 persistent physical complaints reported by the study participants in the study were sleep disturbances, cough, palpitations, myalgia and breathlessness. In a study conducted in Italy, 87.4% patients had at least one post-COVID-19 persistent symptom particularly fatigue and dyspnoea.<sup>27</sup> The causes of prolonged physical symptoms experienced by the patients in the post-COVID state could be due to various reasons. Viral infections elicit an inflammatory response from the immune system and a number of pro inflammatory mediators such as IL-6, TNF-alpha and Interleukin beta are involved in the innate and adaptive responses.<sup>28</sup> Noradrenaline has a potential role in the immune response at systems level and is also involved in regulating depression like symptoms such as fatigue, aches, pains and loss of appetite.<sup>29</sup>

## LIMITATIONS AND FURTHER DIRECTIONS

This study is not without limitations. The major limitations of the study are: 1. Study subjects were assessed in the initial four weeks duration (post infection and discharge from the hospital) where most of them still had fatigue, myalgia, cough and palpitations. Hence the patients could not have achieved a complete sense of well-being They have also spent their time in isolation and hospitalization in the immediate past period. These

could be possible reasons for the anxiety and depressive symptoms experienced by our patients; 2. This is a single center study from a city in south India. Hence, the results may not be generalizable to other populations in India; and 3. Since it is a cross-sectional study, only associations can be identified while directionality and causality could not be suggested.

Future studies should look at the long-term regular follow-up of the post-COVID-19 patients to look into the long-term sequelae of the COVID-19 infection. Cohort studies could throw light on the various factors playing a role in the onset of psychological symptoms in post-covid patients.

## CONCLUSION

Persistent physical symptoms and ongoing life stressors are found to be associated with depression and anxiety among post-COVID-19 patients. Hence, periodic screening for individuals with persisting physical symptoms and care for the vulnerable population such as those with ongoing stressors will provide a significant advantage in the follow up of the mental health of the patients affected with COVID-19.

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