



# Depression, Anxiety, and Insomnia Among Older COVID-19 Survivors: A Cross-Sectional Study

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**Objective:** The psychological morbidities following coronavirus disease (COVID-19) infection among survivors have been identified as a significant public health challenge since the beginning of the COVID-19 pandemic. Emerging evidence indicates higher prevalence of psychological consequences among elderly COVID-19 survivors. The aim of this study was to explore the psychological morbidities among elderly COVID-19 survivors and associated socio-demographic and clinical factors. **Methods:** A cross-sectional study among older COVID-19 survivors (age >50 years) was conducted in a tertiary care hospital from October 2021 to December 2021. Patients attending medical outpatient department were screened for laboratory-confirmed COVID-19 infection in the past and they were recruited for the study after obtaining written informed consent. The study used a semi-structured proforma and rating scales such as Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder Scale (GAD-7), and The Insomnia Severity Index (ISI) for depression, anxiety, and insomnia, respectively. **Results:** The study results indicate that the prevalence of depression, anxiety, and insomnia among 99 older COVID-19 survivors is 35.4%, 31.3%, and 21.2%, respectively. There was statistically significant higher mean of ISI total score ( $p=0.012$ ) among females. There was statistically significant higher mean PHQ-9 total score among widowed/separated/divorced group when compared to married group ( $p=0.006$ ). There was statistically significant higher mean ISI total score ( $p=0.011$ ) among patients who received oxygen therapy while admitted for COVID-19. There was significantly higher rate of depression among females ( $p=0.047$ ), widowed/separated/divorced group ( $p=0.001$ ), and patients who received oxygen therapy ( $p=0.004$ ). **Conclusion:** This study findings implicates that elderly COVID-19 survivors are at significantly higher risk for post-COVID-19 psychological morbidities and should be screened regularly during follow-ups for timely and effective management.

**Keywords:** Post-COVID state; Psychological morbidity; Depression; Anxiety; Insomnia; Elderly

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## INTRODUCTION

The novel coronavirus (severe acute respiratory syndrome coronavirus 2) that causes coronavirus disease (COVID-19) was first observed among a cluster of pneumonia patients in the Chinese city of Wuhan in late December 2019 [1]. Due to the highly contagious nature of the virus, COVID-19 spread rapidly across the globe, resulting in staggering morbidity and mortality [2]. The impact of COVID-19 in India has been devastating, especially during the second wave which began in March 2021 [3]. While writing this manuscript on December 31, 2021, COVID-19 has infected 34,838,804 patients in India and caused 481,080 deaths (<https://www.worldometers.info/>, Worldometer, December 31, 2021; 9 PM IST).

The COVID-19 pandemic significantly changed human life across the world. The abrupt changes in lifestyle in order to comply with public health measures such as lockdown and physical distancing caused significant psychological distress among general population [4,5]. The direct effects of COVID-19 infection as well as the indirect psycho-socio-economic effects of the pandemic also lead to alarming increase in the incidence of common mental disorders such as anxiety, depression, and insomnia among COVID-19 survivors [2,6].

The impact of COVID-19 pandemic on elderly individuals was disproportionately severe [7]. One of the most susceptible group for experiencing the most severe COVID-19 symptoms were elderly individuals [7]. Moreover, the mortality rate among the elderly was reported to be three times higher when compared to

healthy adults [7]. Furthermore, the higher prevalence of medical comorbidities among the elderly, such as diabetes and hypertension, also compounded the severity of COVID-19 in this group [7]. Studies have also documented that COVID-19 infection can predispose psychiatric disorders among elderly individuals due to multiple factors such as neurotropism, systemic inflammation, activation of the hypothalamic–pituitary–adrenal axis, and social changes [7]. Despite the susceptibility for COVID-19 infection as well as pandemic related social changes, emerging evidence indicate that the psychological consequences of the pandemic is relatively less among elderly when compared to younger people [8]. However, a few studies also reported significantly higher rate of psychiatric disorders among elderly COVID-19 survivors [9].

The size of elderly population in India is increasing because of the reduced fertility and mortality rates at national level. There are over 139 million people with over 60 years of age living in India as of 2019, which account for 10% of the population, and the proportion of older people is expected to almost double to 19.5% in 2050 [10]. To the best of our knowledge, there are no studies exploring psychological morbidities among older COVID-19 survivors from India till date. In this cross-sectional study, we explored the prevalence of anxiety, depression, and insomnia, and its correlation among older individuals with confirmed COVID-19 infection after their recovery.

## METHODS

### Subjects

This cross-sectional study on psychological morbidities in older COVID-19 survivors (age >50 years) was conducted in a tertiary care hospital in October 2021 to December 2021. Patients attending medical outpatient department were screened for laboratory-confirmed COVID-19 infection in the past and they were recruited for the study after obtaining written informed consent. This study was approved by Medical Research Ethics Committee of Iqraa International Hospital (REF. NO: IEC/2021/06/04). Patients with past history of psychiatric or major neurological conditions were excluded from the study. The interview was conducted face-to-face using structured questionnaire by a trained medical doctor.

### Measures

Sociodemographic and clinical data were collected using a semi-structured proforma designed for the study. Sociodemographic variables include age, sex, marital status, habitat, and education. The clinical variables include comorbidities, smoking status, vaccination status, details of COVID-19 complications such as encephalopathy, need for hospitalisation, ICU care, oxygen requirement, and need for non-invasive or invasive ventilation.

The psychological morbidities among study participants were assessed by three validated instruments; the 7-item Generalized Anxiety Disorder Scale (GAD-7), the 9-item Patient Health Questionnaire (PHQ-9), and the Insomnia Severity Index (ISI).

GAD-7 is a commonly used tool to assess anxiety symptoms [11]. It is a self-administered questionnaire in which respondents were asked to rate how often they have been troubled by the described symptoms over the past 2 weeks. The respondents were asked to rate their experiences on a 4-point rating scale from 0 (not at all) to 3 (every day). The total GAD-7 scores can range from 0 to 21. The higher score represents higher severity levels of anxiety symptoms. The total GAD-7 score cutoff points 5, 10, and 15 represents mild, moderate, and severe levels of anxiety, respectively.

PHQ-9 is a commonly used tool to assess depressive symptoms [12]. It is a self administered questionnaire comprising of 9 items in which respondents were asked to rate the how often they have been troubled by the described symptoms over the past 2 weeks, on a 4-point rating scale from 0 (not at all) to 3 (every day). The total PHQ-9 scores can range from 0 to 27. The higher score represents higher severity levels of depressive symptoms. The total PHQ-9 score cutoff points 5, 10, 15, and 20 represents mild, moderate, moderately severe, and severe levels of depression, respectively.

ISI is a commonly used validated instrument used to measure the severity of insomnia [13]. It is a seven item self administered questionnaire providing self-reported level of sleep quality and insomnia. Each question is rated on a 0–4 scale, and the total ISI scores range from 0 to 28. The higher score represents severe level of insomnia symptoms. Insomnia on the ISI was classified as none (0–7), subthreshold (8–14), moderate (15–21), or severe (22–28).

Statistical analysis was performed with SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as mean, standard deviation (SD), and percentages were calculated. The Kolmogorov-Smirnov test was used to verify the normality of distribution. The nonparametric tests Mann-Whitney U Test was performed for comparing non-normally distributed continuous dependent variables with categorical independent variables.  $\chi^2$ -test was used to compare categorical variables. For all tests, values of  $p \leq 0.05$  were considered statistically significant.

## RESULTS

A total of 99 older COVID-19 survivors participated in this study. The age of the respondents ranged from 50 to 79 years, with a mean age of 59.97 years. Among the 99 participants, 57.6% of the respondents were females, 89.7% studied below 10 years of formal education, 96% were married, and 61.2% of the respondents were living in rural areas. The proportion of respondents with co-morbid medical conditions was 67.7%. Regarding the clinical profile due to COVID-19 infection, the proportions of respondents with a history of hospitalization, pneumonia, ICU care, oxygen therapy, non-invasive mechanical ventilation, and mechanical ventilation were 41.4%, 16.2%, 8.1%, 8.1%, 4%, and 5.1%, respectively. Of the respondents, 72% reported persisting symptoms following COVID-19 at the time of the study. Only 4% had history of psychiatric illness in the family and 10.1% reported

death of a close relative due to COVID-19 infection. The socio-demographic and clinical details are summarised in Table 1.

Thirty-five (35.4%) respondents reported clinically significant depression; 21 respondents reported mild depression, 12 reported moderate depression, and 2 reported moderately severe depression. Thirty-one (31.3%) respondents reported clinically significant anxiety; 19 reported mild anxiety, 7 reported moderate anxiety, and 5 reported severe anxiety. Subthreshold insomnia was reported by 18.2% of respondents, and 3.0% reported clinically significant insomnia. The psychological morbidities of the respondents are summarized in Table 2.

There was statistically significant higher mean of ISI total score ( $p=0.012$ ) and BMI ( $p=0.001$ ) among females. There was statistically significant higher mean PHQ-9 total score among widowed/separated/divorced group when compared to married group ( $p=0.006$ ). There was statistically significant higher mean ISI total score ( $p=0.011$ ) among patients who received oxygen therapy while admitted for COVID-19. There was significantly higher rate of depression among females ( $\chi^2=7.96$ ,  $df\ 3$ ,  $p=0.047$ ), widowed/separated/divorced group ( $\chi^2=11.97$ ,  $df\ 3$ ,  $p=0.001$ ), and patients who received oxygen therapy ( $\chi^2=13.27$ ,  $df\ 3$ ,  $p=0.004$ ). The association between significant variables and depression are summarised in Table 3.

## DISCUSSION

The psychological morbidities following COVID-19 infection among survivors have been identified as a significant public health challenge since the beginning of the COVID-19 pandemic [14]. However, there are only limited studies exploring post-COVID-19 psychiatric sequelae. Despite the risks of severe COVID-19 infection in the elderly population, only few studies investigated psychological morbidities among elderly COVID-19 survivors [9,15]. Even though the available studies among elderly populations during COVID-19 indicated that despite multiple risk factors, psychological consequences were relatively less among elderly population when compared to younger individuals, emerging evidence indicates higher prevalence of psychological consequences among elderly COVID-19 survivors [9,15]. Here, we reported the prevalence of depression, anxiety, and insomnia in elderly COVID-19 survivors. To the best of our knowledge, the current study is the first study from India to present data on the psychological consequences of COVID-19 infection among elderly COVID-19 survivors.

The prevalence of depression, anxiety, and insomnia among the 99 elderly COVID-19 survivors is 35.4%, 31.3%, and 21.2%, respectively. The prevalence of depression and anxiety reported in this study is significantly higher when compared to a similar study conducted among COVID-19 survivors (healthcare workers: 78.5% between the age group of 20–30 years) working in the hospital where the current study was conducted [16]. The rate of depression and anxiety reported in the above study was 26.2% and 12.1%, respectively [16]. Moreover, the rate of anxiety and depression in this study is also significantly higher when compared

**Table 1.** Socio-demographic and clinical profile of the study participants

Variable	Value (n=99)
Sex	
Female	57 (57.6)
Male	42 (42.4)
Education (n=97)	
Upto 10th standard	87 (89.7)
10 to 12th standard	4 (4.1)
Graduate	6 (6.2)
Marital status	
Married	95 (96)
Widowed or separated or divorced	4 (4)
Habitate (n=98)	
Rural	60 (61.2)
Urban	25 (25.5)
Semiurban	13 (13.3)
Comorbidities	
Yes	67 (67.7)
No	32 (32.3)
Vaccination	
Not taken	55 (55.6)
One dose	32 (32.3)
Two doses	12 (12.1)
Hospitalisation	
Yes	41 (41.4)
No	58 (58.6)
Pneumonia	
Yes	16 (16.2)
No	83 (83.8)
ICU admission	
Yes	8 (8.1)
No	91 (91.9)
Oxygen therapy	
Yes	8 (8.1)
No	91 (91.9)
Non-invasive ventilation	
Yes	4 (4)
No	95 (96)
Mechanical ventilation	
Yes	5 (5.1)
No	94 (94.9)
Persistent symptoms	
Yes	72 (72.7)
No	27 (27.3)
Family history of psychiatric illness	
Yes	4 (4)
No	95 (96)
Death of a close relative due to COVID-19	
Yes	10 (10.1)
No	89 (89.9)

Values are expressed as number (%).

to other studies among COVID-19 survivors in India and other countries. Devi et al. [17] explored depression and anxiety among COVID-19 survivors (majority of the participants between the

age group of 30–60 years) at post-COVID follow-up clinic in India and found that the rate of depression and anxiety was 21.9% and 11.9%, respectively. Mei et al. [18] conducted a similar study in China (median age of the participants: 59 years) and found that the rate of depression and anxiety was 14.2% and 12.2%, respectively. However, another study from northern India explored anxiety and depressive symptoms in COVID-19 survivors (mean age of the participants: 54.2 years) and found that the prevalence of anxiety and depression was 44.54% and 61.34%, respectively, with significantly higher rate among older COVID-19 survivors ( $\geq 50$  years) compared to younger ones [15]. However, this study used the Hospital Anxiety and Depression Scale (HADS) for evaluating anxiety and depression among the study population. From this study findings, it can be concluded that the psychological consequences of COVID-19 infection among elderly COVID-19 survivors are significantly higher when compared to similar studies among younger COVID-19 survivors. This study findings implicates that elderly COVID-19 survivors, in spite of

their resilience, are at significantly higher risk for post-COVID-19 psychological morbidities and should be screened for depression and anxiety disorders regularly during follow-ups for timely and effective management [19].

Female sex was found to be significantly associated with depression and insomnia among the elderly COVID-19 survivors. The higher rate of depression and insomnia among females following COVID-19 infection is consistent with previous published study findings [15–18]. Multiple studies have shown that COVID-19 pandemic has affected women much more adversely than men, both as frontline workers and at home [20]. The COVID-19 pandemic might have exacerbated already existing gender disparities as women are disproportionately responsible for the bulk of domestic tasks, including childcare and eldercare [21].

The higher rate of depression among elderly COVID-19 survivors who were living without a spouse highlights the significant role of relationship status during the COVID-19 pandemic on the mental health of individuals. A recent study reported significantly higher levels anxiety and depression among individuals living alone during the COVID-19 pandemic compared to those living with a spouse [22]. Nkire et al. [23] also reported significantly higher PHQ-9 mean total among groups who self-identified as separated or divorced when compared to those having partners.

There was statistically significant association between history of oxygen therapy for COVID-19 treatment and insomnia severity and depression, indicating that baseline clinical status during COVID-19 infection might influence the occurrence of psychiatric symptomatology following recovery from COVID-19 infection. However, another recent study could not find any significant association between baseline clinical status, including inflammatory markers, and psychiatric sequelae at one month follow-up after hospital treatment for COVID-19 infection [24]. There is a need to explore further the role of baseline clinical characteristics in predicting psychiatric consequences following COVID-19 infection so that preventive and therapeutic psychiatric support can be tailored to the high risk groups.

This study has the following limitations. The study was conducted among elderly COVID-19 survivors from a single city in south India. Hence, the findings of the study may not be gener-

**Table 2.** Prevalence of anxiety, depression, and insomnia

Variable	Value (n=99)
Depression	
Nil	64 (64.6)
Mild	21 (21.2)
Moderate	12 (12.1)
Moderately severe	2 (2)
Severe	0
Anxiety	
Nil	68 (68.7)
Mild	19 (19.2)
Moderate	7 (7.1)
Severe	5 (5.1)
Very severe	0
Insomnia	
Nil	78 (78.8)
Subthreshold insomnia	18 (18.2)
Clinically significant insomnia	3 (3)

Values are expressed as number (%). Percentages may not total 100 due to rounding.

**Table 3.** Association between significant variables and depression

Variable	Depression				p value
	Nil	Mild	Moderate	Moderately severe	
Sex					0.047
Female	33 (51.6)	12 (57.1)	11 (91.7)	1 (50)	
Male	31 (48.4)	9 (42.9)	1 (8.3)	1 (50)	
Marital status					0.001
Married	64 (100)	20 (95.2)	9 (75)	2 (100)	
Widowed or separated or divorced	0	1 (4.8)	3 (25)	0	
History of oxygen therapy for COVID-19					0.004
Yes	1 (1.6)	6 (28.6)	1 (8.3)	0	
No	63 (98.4)	15 (71.4)	11 (91.7)	2 (100)	

$\chi^2$ -text was used to compare categorical variables. Values are expressed as number (%).

alisable to elderly COVID-19 survivors. Moreover, the cross-sectional design of the study limits causal understanding of psychiatric consequences following COVID-19 infection among the study population. Well conducted multi-centric longitudinal studies are needed to enhance our understandings regarding factors influencing psychiatric sequelae following COVID-19 infection in the elderly population.

In conclusion, this study reports data on the psychiatric sequelae of COVID-19 infection among elderly COVID-19 survivors. This study findings showed that elderly COVID-19 survivors suffer from significantly higher rate of depression. Female sex, living without a spouse, and history of oxygen therapy for COVID-19 treatment were associated with higher rates psychological morbidities. This study findings implicates that elderly COVID-19 survivors are at significantly higher risk for post-COVID-19 psychological morbidities and should be screened regularly during follow-ups for timely and effective management.

### Funding Statement

None

### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

### Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

### Author Contributions

Conceptualization: Nalakath A. Uvais, Shamsudeen Moideen. Data curation: Nalakath A. Uvais, Shamsudeen Moideen. Formal analysis: Nalakath A. Uvais, Shamsudeen Moideen. Investigation: Nalakath A. Uvais, Shamsudeen Moideen. Methodology: Nalakath A. Uvais, Shamsudeen Moideen. Project administration: Nalakath A. Uvais, Shamsudeen Moideen. Resources: Nalakath A. Uvais, Shamsudeen Moideen. Software: Nalakath A. Uvais, Shamsudeen Moideen. Supervision: Nalakath A. Uvais, Shamsudeen Moideen. Writing—original draft: Nalakath A. Uvais, Shamsudeen Moideen. Writing—review & editing: Nalakath A. Uvais, Shamsudeen Moideen.

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