

Prevalence of Psychiatric Morbidity and their Clinical Correlates in Patients Post COVID-19: A Cross-sectional Study from Rural Northern India

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ABSTRACT

Introduction: Myriad of complications were observed in post Coronavirus Disease (COVID-19) survivors, psychiatric morbidities among one of them. Recent body of research has shown that significant number of patients developed psychological symptoms following COVID-19. Most of the Indian studies have assessed psychological morbidity among COVID-19 patients during admission. However, very few Indian studies have assessed the psychological impact of COVID-19 during the follow-up period, especially in rural northern India.

Aim: The study aimed to determine the prevalence of depression and anxiety and evaluate related socio-demographic (age, gender, education, occupation and marital status) and clinical factors (severity of COVID-19, presence of medical co-morbidity, Oxygen requirement, Intensive Care Unit (ICU) referral, duration of admission) in patients post COVID-19.

Materials and Methods: This was a cross-sectional study conducted at Hind Institute of Medical Sciences, Sitapur, Uttar Pradesh, India, among 96 patients, post COVID-19 after their discharge from the hospital. Data collection was done between July 2021 to September 2021, using a semi-structured proforma and a psychiatric diagnosis was made (based on International Classification of Diseases- 10th Edition Diagnostic Criteria for Research criteria and clinically approved by two qualified psychiatrists). Rating scales such as Hamilton Anxiety Rating

Scale (HAM-A) and Hamilton Depression Rating Scale (HAM-D) were used for severity assessment. Data was analysed using Microsoft Statistical Package for Social Sciences (SPSS) version 20.0. A p-value of <0.05 was considered significant.

Results: In 96 patients, 70 (72.91%) were males. 38 patients (39.58%) were of the age group 45-60 years. A total of 36 (37.50%) patients had depression. Anxiety was seen in 40 (41.66%) participants. Among the clinical variables, the severity of the COVID-19 infection (p-value <0.01), presence of co-morbidity (p-value <0.01), and ICU referral (p-value <0.01), were found to be associated significantly with the presence of depression in the participants. Among 36 depressive patients, mild depression was present in 17 (47%), moderate depression in 12 (33%), severe depression in 5 (14%) and very severe in 2 (6%) of the participants. Anxiety was associated significantly with the gender (p-value=0.02), co-morbidity (p-value <0.01), severity of illness (p-value <0.01), oxygen requirement (p-value=0.04) and ICU admission (p-value <0.01). Mild anxiety was observed in 18 (45%), moderate anxiety in 16 (40%) and severe anxiety in 6 (15%).

Conclusion: The prevalence of depression and anxiety is high in patients, post COVID-19. The severity of these disorders is significantly associated with presence of medical co-morbidity and severity of COVID-19. Hence, thorough evaluation and management of these disorders in post COVID-19 patients can help in improving the overall outcome.

Keywords: Anxiety, Coronavirus disease 2019, Depression, Mental health, Severe acute respiratory syndrome coronavirus-2

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) was first reported in Wuhan, China in 2019 and then it spread like wildfire engulfing whole world [1]. It is caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) [1]. The COVID-19 is generally characterised by symptoms such as fever, chills, cough, nausea, coryza, sore throat, myalgia and breathing difficulty of varying proportions [2]. Various research studies in the past have suggested that Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) survivors are more likely to develop mental illnesses like depression, anxiety, and Post-Traumatic Stress Disorder (PTSD), which can linger for months or years after being discharged from the hospital [3]. Similarly, besides from physical symptoms and life-threatening medical complications, COVID-19 causes plethora of psychiatric morbidities ranging from depression, anxiety, panic attacks and delirium. Multiple causative factors have been attributed explaining psychiatric manifestation of coronavirus infection; like a direct neuronal invasion by coronavirus, dysregulated immunological response, abnormal activation of the hypothalamo-

pituitary-adrenal axis, cerebrovascular hypoxia and metabolic derangements. Psychiatric symptoms can also be observed secondary to the side effects of drugs used to treat COVID-19 like oseltamivir, corticosteroids and interferons [4,5].

Additionally, patients suffering from COVID-19 can develop psychiatric morbidity because of the stigma associated with the disease, social isolation, concern and uncertainty about the outcome of this infection and limited information about the pandemic. The severity of psychiatric symptoms increases proportionally to the severity of COVID-19 infections [6-8]. However, most of the times patient's mental well-being is often neglected and compromised during the treatment of COVID-19 because of stigma, dearth of qualified psychiatrists and infrastructure. Psychological distress and depression may have an adverse effect on patient's immune system response [9-11]. Psychiatric morbidity negatively influences the long-term outcome of COVID-19 patients, as it might lead to poor medication compliance. This warrants the urgent need to address the mental health issues accompanying viral pandemics like COVID-19. Therefore, strengthening consultation-liaison psychiatric services

should be encouraged for the early detection and management of psychiatric disorders in patients post COVID-19.

According to a survey conducted by the Indian Psychiatric Society, COVID-19 pandemic and resulting lockdown has led to a 20% rise in patients with mental illness [12]. Different research studies in India, have assessed the psychological impact of the COVID-19 pandemic in different clinical scenarios ranging from during quarantine/isolation, follow-up visits among the general public and high-risk populations such as frontline workers [11-14]. COVID-19 has drastically affected people's quality of life by having long-term ramifications on their day-to-day lives, jobs and relationships [15,16]. Most of the Indian studies have studied the impact of COVID-19 on the mental health of the patients during admission, however very few Indian studies have documented the psychological impact of COVID-19 after discharge from the COVID hospital. In a cross-sectional study, conducted by Gaur V et al., in clinically stable COVID-19 patients, the prevalence of depression and anxiety was found to be 44.44% and 34.72%, respectively [17]. In another study by Devi D et al., the prevalence of depression and anxiety among patients post COVID-19 was 21.9% and 11.9%, respectively [18]. Therefore, it is necessary to better understand the long-term psychological ramifications of COVID-19 to provide timely psychological interventions. This will not only ensure holistic management of the patients, but will also help improve the long-term outcome of COVID-19.

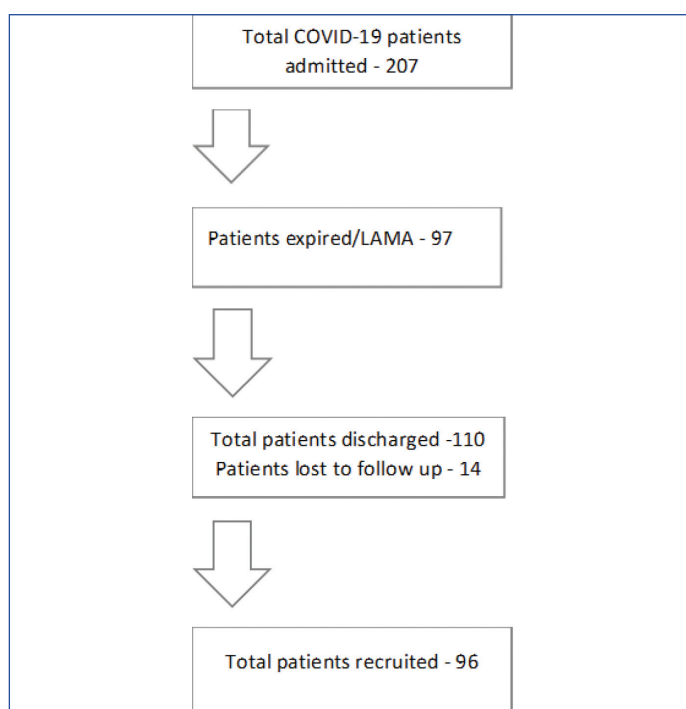
It was hypothesised in the present study, that the prevalence of depression and anxiety is high in patients post COVID-19 and they have a significant association with various socio-demographic and clinical parameters, especially in rural areas because they had very little access to the knowledge and developments about COVID-19. Moreover, rural population has slightly different socio-cultural beliefs regarding diseases as compared to their urban counterparts. Socio-cultural beliefs and accessibility to medical services play a very important role in determining the long-term outcome of a disease. The present study covered predominantly a rural population afflicted with COVID-19 and to the best knowledge of the authors, none of the COVID-19 study in India has exclusively covered the rural population. Hence, the present study was planned to determine the prevalence of depression and anxiety and evaluate their socio-demographic (age, gender, education, occupation and marital status clinical correlates (severity of COVID-19, presence of medical co-morbidity, O₂ requirement, ICU referral, duration of admission) in patients post COVID-19, so that it will help in the holistic management and rehabilitation of such patients back into the community.

MATERIALS AND METHODS

This was a cross-sectional study conducted at Hind Institute of Medical Sciences, Sitapur, Uttar Pradesh, India. The study institute is located 50 km towards South from District headquarters Sitapur and 49 km from State capital Lucknow. HIMS, Ataria, Sitapur was one of the designated COVID-19 L2 (Level-2) hospitals during the pandemic. All the patients post COVID-19, (diagnosed cases of COVID-19, atleast one month after their discharge from HIMS, Sitapur) attending follow-up COVID-19 Clinic at the Department of Respiratory Medicine and Department of Internal Medicine, between July 2021 to September 2021 were recruited into the study.

Total 207 COVID-19 positive patients were admitted during the second wave of pandemic at HIMS, Sitapur. Out of total, 96 patients were recruited into the study, as rest of the either patients did not meet the inclusion criteria or did not attend the follow-up clinics after their discharge [Table/Fig-1].

All the recovered COVID-19 positive patients attending the follow-up clinic in Department of Respiratory Medicine and Department of Internal Medicine postrecovery between July 2021 to September 2021 were approached and included in the study after informed consent. A recovered COVID-19 patient in the present study was



[Table/Fig-1]: Recruitment of participants in the study.

defined as an adult (18 years and older) with a confirmed positive result on reverse transcription-polymerase chain reaction testing for the COVID-19 virus on oropharyngeal and nasopharyngeal fluid, who was treated successfully and discharged with a COVID-19 discharge certificate. The study was approved by the Institute Ethics Committee under ethical approval number (IEC/IRB NO: HIMS/IRB/2020-21/43).

Inclusion criteria: Informed consent was taken from all the participants. All the patients post COVID-19, (diagnosed cases of COVID-19, atleast one month after their discharge from the study institute attending follow-up COVID-19 Clinic at the Department of Respiratory Medicine and Department of Internal Medicine were included in the study.

Exclusion criteria: Patients who refused to provide consent to participate in the study and patients with a past history of psychiatric disorders like anxiety, depression, dementia, schizophrenia, substance abuse and/or a history of treatment with psychotropic drugs were excluded from the study.

Study Procedure

A semi-structured proforma was used for collecting socio-demographic and clinical details and it was filled by the investigator. History was collected from patient and reliable informants (First degree relatives). This semi-structured proforma was designed by the faculties of the Department of Psychiatry, Respiratory Medicine and Internal Medicine and it was approved by the Scientific Research Committee of the Institute. It comprised of details of age, gender, education, occupation and marital status. Education was grouped under illiterate, upto upper primary (preprimary, primary and upper primary), upto senior secondary (secondary and senior secondary) and graduate/postgraduation education [19]. Employment status was grouped as either employed or unemployed. Marital status was classified as married/unmarried/widowed. COVID-19 related variables explored included severity of COVID-19 infection, presence of medical co-morbidity, oxygen requirement, Intensive Care Unit (ICU) referral, duration of admission, history of psychiatric illness before being diagnosed with COVID-19, and knowledge of the death of close relative or friend who died with COVID-19. The severity of COVID-19 was assessed by doctors at the time of admission based on guidelines given by the Ministry of Health and Family Welfare (MOHFW) [20] and the same was documented in the case records of the patients. These case records were retrieved during the follow-up and patients were classified into mild, moderate, and severe

categories of COVID-19 illness [20], depending upon the severity of symptoms during admission like those patients who had fever, dry cough, myalgia and other non specific symptoms were categorised as mild illness, while those patients who had above symptoms along with dyspnoea on exertion or tachypnoea (respiratory rate >24/minute) and saturation of peripheral oxygen (SpO₂) 90-94% on room air were categorised as moderate illness; patients having any of the above signs and symptoms with SpO₂ less than 90% on room air or respiratory rate >30/minutes were categorised into "severe illness" category. Clinically, the diagnosis of depression and anxiety were established as per International Classification of Diseases-10th edition, diagnostic criteria for research [21] and was clinically approved by two qualified psychiatrists.

Hamilton Depression Rating Scale (HDRS): The HDRS was used to assess and rate the severity of depressive symptoms. It is a popular scale containing 21 items related to symptoms of depression. Score is calculated from first 17 items. Interpretation is:

0-7=Normal;

8-13=Mild depression;

14-18=Moderate depression;

19-22=Severe depression and

>23=Very severe depression.

It has sensitivity of 86.4% and specificity of 92.2% and has good internal, inter-rater, and retest reliability [22].

Hamilton Anxiety Rating Scale (HARS): The HARS was used to assess and rate the symptoms of anxiety. It consists of 14 items which measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0-56, where:

<17 indicates mild severity,

18-24 indicates mild to moderate and

25-30 indicates severe symptoms of anxiety.

It has sensitivity of 85.7% and specificity of 63.5% and has good reliability and validity [23].

STATISTICAL ANALYSIS

All the statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive analysis, using mean for variables such as clinical parameters and socio-demographic profile was assessed. Chi-square test was used to evaluate association between categorical variables (like the association of depression and anxiety with socio-demographic

(age, gender, occupation, education and marital status) and clinical factors (severity of COVID-19, presence of medical co-morbidity, O₂ requirement, ICU referral and duration of admission). A p-value of <0.05 was considered to be significant.

RESULTS

The study sample comprised of 96 participants, consisting of 70 (72.91%) males and 26 (27.08%) females. A total of 38 (39.58%) participants were 45-60 years of age group. Among participants only 10 (10.41%) were illiterates. Around 62 (64.58%) of the participants were employed and 56 (58.33%) were married. In the present study, 36 (37.50%) participants were found to be suffering from depression. Among socio-demographic variables, an association of depression was found to be statistically significant with gender (p-value=0.02), marital status (p-value <0.01) and occupational status (p-value <0.01) of the participants [Table/Fig-2].

The majority of the participants had mild COVID-19 infection i.e. 64 (66.66%). Only 15 (15.62%) and 17 (17.70%) of them had moderate and severe infections, respectively. A total of 49 (51.04%) of the participants had co-morbid chronic medical illnesses. Among participants with co-morbidities, 20 (20.83%) had diabetes, 18 (18.75%) had hypertension, 6 (6.25%) had COPD and 5 (5.20%) had asthma. Around 17 (17.70%) patients needed ICU referral during their stay at the hospital. During the admission in hospital, 64 (66.66%) participants had stayed for more than 14 days, while 32 (33.33%) stayed for less than 14 days. Only, 5 (5.20%) participants lost their relatives in that phase. Among the clinical variables, the severity of the COVID-19 infection (p-value <0.01), presence of co-morbidity (p-value <0.01), and ICU referral (p-value <0.01), were found to be associated significantly with the presence of depression in the participants [Table/Fig-3].

Among 36 depressive patients, mild depression was present in 17 (47%), moderate depression in 12 (33%), severe depression in 5 (14%) and very severe in 2 (6%) of the participants [Table/Fig-4]. Forty (41.66%) participants were found to be suffering from anxiety disorder. In patients suffering from anxiety, mild anxiety was observed in 18 (45%), moderate anxiety in 16 (40%) and severe anxiety in 6 (15%) [Table/Fig-5]. When socio-demographic variables of the participants were evaluated for statistical association with anxiety, only gender was found to be associated significantly (p-value=0.02) [Table/Fig-6]. While in the clinical variables of the participants, the presence of co-morbidity (p-value <0.01), severity of illness (p-value <0.01), oxygen requirement (p-value=0.04) and ICU admission (p-value <0.01) were found to be associated significantly with the presence of anxiety [Table/Fig-7].

Socio-demographic profile (Variables)	Categories	Number of patients (N=96) n (%)	Depression (n=36) n (%)	Chi-square (χ ²)	p-value
Age (years)	<30	12 (12.5%)	4 (33.33%)	2.1241	0.54
	30-45	24 (25%)	9 (37.5%)		
	46-60	38 (39.58%)	12 (31.57%)		
	>60	22 (22.91%)	11 (50%)		
Gender	Male	70 (72.91%)	31 (44.28%)	5.0078	0.02*
	Female	26 (27.08%)	5 (19.38%)		
Education	Illiterate	10 (10.41%)	3 (30%)	4.3008	0.23
	Upto upper primary	39 (40.62%)	12 (30.76%)		
	Upto senior secondary	30 (31.25%)	11 (36.66%)		
	Graduate/Postgraduate	17 (17.70%)	10 (58.82%)		
Occupation	Employed	62 (64.58%)	17 (27.41%)	7.5901	<0.01*
	Unemployed	34 (35.41%)	19 (55.88%)		
Marital Status	Married	56 (58.33%)	7 (12.5%)	35.84	<0.01*
	Unmarried/ Divorced/Widow	40 (41.66%)	29 (72.5%)		

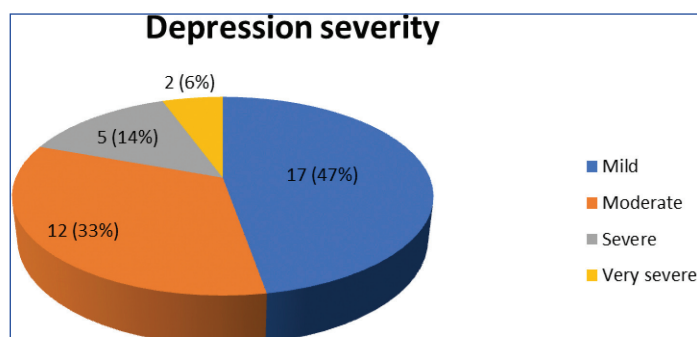
[Table/Fig-2]: Socio-demographic variables of the participants and their correlation with depression.

*p<0.05=significant

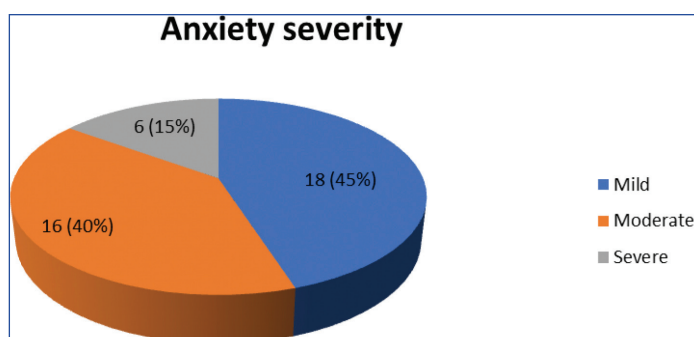
Clinical profile (Variables)	Categories	Number of patients (N=96) n (%)	Depression (n=36) n (%)	Chi-square (χ^2)	p-value
Severity of illness COVID-19	Mild	64 (66.66 %)	10 (15.62%)	39.2188	<0.01*
	Moderate	15 (15.62%)	12 (80%)		
	Severe	17 (17.70%)	14 (82.35%)		
Presence of co-morbidity	Diabetes	20 (20.83%)	14 (70%)	24.0354	<0.01*
	Hypertension	18 (18.75%)	12 (60%)		
	COPD	6 (6.25%)	2 (33.33%)		
	Asthma	5 (5.20%)	2 (40%)		
Supportive oxygen requirement	Yes	32 (33.33%)	16 (50%)	3.2012	0.07
	No	64 (66.66%)	20 (31.25%)		
ICU referral	Yes	17 (17.70%)	12 (70.58%)	9.6524	<0.01*
	No	79 (82.29%)	24 (30.37%)		
Duration of hospital stay	<14 Days	32 (33.33%)	10 (31.25%)	0.8451	0.37
	>14 Days	64 (66.66%)	26 (40.62%)		
Death of a relative	Yes	5 (5.20%)	2 (40%)	0.0141	0.90
	No	91 (94.79%)	34 (37.36%)		

[Table/Fig-3]: Clinical variables of the participants and their association with depression.

*p≤0.05=significant; COPD: Chronic obstructive pulmonary disease; ICU: Intensive care unit



[Table/Fig-4]: Percentage distribution of depression (n=36) severity according to HAM-D scale.



[Table/Fig-5]: Percentage distribution of anxiety (n=40) severity according to HAM-A scale.

Socio-demographic profile (variables)	Categories	Number of patients (N=96) n (%)	Anxiety (n=40) n (%)	Chi-square (χ^2)	p-value
Age (years)	<30	12 (12.5%)	5 (41.66%)	2.3705	0.49
	30-45	24 (25%)	10 (41.66%)		
	46-60	38 (39.58%)	13 (34.21%)		
	>60	22 (22.91%)	12 (54.54%)		
Gender	Male	70 (72.91%)	34 (48.57%)	5.0698	0.02*
	Female	26 (27.08%)	6 (23.07%)		
Education	Illiterate	10 (10.41%)	4 (40%)	4.8726	0.18
	Upto upper primary	39 (40.62%)	13 (33.33%)		
	Upto senior secondary	30 (31.25%)	12 (40%)		
	Graduate/Postgraduate	17 (17.70%)	11 (64.70%)		
Occupation	Employed	62 (64.58%)	22 (35.48%)	2.7533	0.09
	Unemployed	34 (35.41%)	18 (52.94%)		
Marital Status	Married	56 (58.33%)	23 (41.07%)	0.0196	0.88
	Unmarried/Divorced	40 (41.66%)	17 (42.5%)		

[Table/Fig-6]: Socio-demographic variables of the participants and their association with anxiety.

*p-value ≤0.05 was considered as statistically significant

Clinical profile (variables)	Categories	Number of patients (N=96) n (%)	Anxiety (n=40) n (%)	Chi-square (χ^2)	p-value
Severity of Illness of COVID-19	Mild	64 (66.66 %)	12 (18.75%)	42.1392	<0.01*
	Moderate	15 (15.62%)	12 (80%)		
	Severe	17 (17.70%)	16 (94.11%)		
Presence of co-morbidity	Diabetes	20 (20.83%)	17 (85%)	41.6478	<0.01*
	Hypertension	18 (18.75%)	14 (77.77%)		
	COPD	6 (6.25%)	3 (50%)		
	Asthma	5 (5.20%)	2 (40%)		

Supportive oxygen requirement	Yes	32 (33.33%)	18 (56.25%)	4.2000	0.04*
	No	64 (66.66%)	22 (34.37%)		
ICU referral	Yes	17 (17.70%)	14 (82.35%)	14.0697	<0.01*
	No	79 (82.29%)	26 (32.91%)		
Duration of hospital stay	<14 days	32 (33.33%)	12 (37.5%)	0.3429	0.55
	>14 days	64 (66.66%)	28 (43.75%)		
Death of a contact relative	Yes	5 (5.20%)	2 (40%)	0.0060	0.93
	No	91 (94.79%)	38 (41.75%)		

[Table/Fig-7]: Clinical variables of the participants and their correlation with anxiety.

*p-value ≤ 0.05 was considered as significant. COPD: Chronic obstructive pulmonary disease; ICU: Intensive care unit

DISCUSSION

During the outbreak of viral pandemics, an increase prevalence of Depression and anxiety has been reported among postinfected patients across the globe. It was hypothesised in this study that the prevalence of depression and anxiety is high in patients post COVID-19 and they have a significant association with various socio-demographic and clinical parameters. This hypothesis was found to be true as in the present study, 37% of the patients had a depressive disorder and 41% of them suffered from anxiety disorders. The prevalence of psychiatric morbidity has ranged from 10% to 48% in various international studies [24-28].

According to Wang C et al., about three fourth of the Chinese population showed significant psychological impact in the form of depressive symptoms during the initial stage of the 2019 coronavirus disease in China [24]. Kong X et al., reported that 34.72% and 28.47% patients with COVID-19 had symptoms of anxiety or depression, respectively [25]. Present study, also depicted similar findings in terms of prevalence of depression and anxiety. The COVID-19 infection has been known to have far reaching ramifications on the brain and cause plethora of psychological symptoms in an individual. Viral infections triggers dysregulated inflammatory response and as a result number of proinflammatory mediators such as Tumour Necrosis Factor-alpha (TNF-alpha), interleukin-6 (IL-6) and interleukin beta cytokines are released. Noradrenaline is also known to play important role in regulating depression like symptoms such as fatigue, aches, pains and loss of appetite. Additionally, the stigma of being diagnosed as COVID-19 positive further exacerbates the problem [29,30]. Certain Indian studies have also documented prevalence rates ranging from 10% to 40% [18,31,32]. Prajapati NK et al., reported 73.3% psychiatric morbidity in COVID-19 patients [31]. Major depressive disorder was present in 8.7% of the patients.

In a cross-sectional survey, conducted using an electronic questionnaire, around 25%, 28% and 11.6% of the participants were moderate to extremely severely depressed, anxious and stressed, respectively [32]. Major depressive disorder was present in 8.7% of the patients. In another study by Devi et al., the prevalence of depression and anxiety among patients post COVID-19 was 21.9% and 11.9%, respectively [18]. However, some Indian studies have reported the prevalence of psychiatric morbidity to be very high ranging from 50% to 70% [33-36]. In a study to determine the prevalence of psychiatric morbidities among COVID-19 survivors in Northern India, the prevalence of anxiety and depression, was found to be 44.54% and 61.34%, respectively [33]. Yadav R et al., in their cross-sectional study reported prevalence of depression in 27% and anxiety in 67% of the participants [34]. Kumar P et al., reported depression in 48% of the admitted COVID-19 patients and anxiety was seen more commonly in females (60%) than in male patients (28.75%) [35]. In another study, the prevalence of depression among hospitalised COVID-19 positive was nearly 40% [36]. Bharti P et al., reported the prevalence of depression and anxiety to be 64% and 61%, respectively among COVID-19 in patients [37]. The higher prevalence of psychiatric morbidity in above mentioned studies can be attributed to the use of different sampling methods, diagnostic tools and rating scales. Another possible explanation for the above

mentioned phenomenon can be because of the differences in the timing of the study. The present study was conducted during the post COVID-19 period (after the peak of the second wave in India). Some of the studies were conducted either at the beginning of the pandemic or at the peak of the pandemic.

Depression and anxiety in the participants were associated with the presence of male gender, marital status, employment status, medical co-morbidity, the severity of illness and ICU admission and this association was statistically significant (p-value < 0.05). In present study, majority of the patients were male (72%) and it can be explained by the fact that in rural northern India, males are the sole earning member of their families and have to venture out in order to earn. Hence, they are more vulnerable to acquire COVID-19 infection and subsequent psychiatric morbidity [34]. This is similar to the study, conducted by Prajapati NK et al., Kumar P et al. and Iqbal Y et al., [31,35,38]. However, in some studies higher psychiatric morbidity has been reported in females [39,40]. Sympathetic-adrenal and HPA responsiveness is attenuated by female sex hormones. This results in sluggish control feedback on the brain and less or delayed containment of the response among women [41]. Moreover, the additional burden of household chores and care-giving further compounds the problem for Indian females [18]. Psychiatric morbidity was higher in single/divorced individuals and can be explained by the absence of a strong family support system in such individuals. The traditional family support system in India is known to act as buffer and absorb various kinds of stress during the time of crisis [42,43]. Depression was more prevalent in unemployed participants and it can be attributed to fear of financial insecurity, and overall economic ramifications of COVID-19. Secure financial system provides buffer against adversity. Sample size was predominantly agrarian-based homogenised rural population. Most of the patients fall under middle lower and lower upper segment (according to modified Kuppuswamy classification). Hence, socio-economic status was not used in the results [44].

Around 51.04% of the participants had co-morbid chronic medical illnesses. Most common among them was diabetes followed by hypertension, Chronic Obstructive Pulmonary Disease (COPD) and asthma. Medical co-morbidities were significantly associated with depression and anxiety (p-value < 0.05). This was in concurrence with the study by Arbelo N et al., in which severe somatic co-morbidities were significantly associated with delirium, major and minor mental illnesses [45]. Psychiatric morbidity was higher in patients suffering from severe COVID-19 infection and those who required ICU referrals. This can be explained by the fact that, exacerbation of psychological symptoms is perpetuated by rapid deterioration of physical health and social isolation owing to COVID-19. These findings have been mirrored by various studies, which have found increased prevalence of psychiatric morbidity in admitted patients of COVID-19 having co-existing medical morbidity [46,47]. Moreover, apprehensions pertaining to long-term ramifications of infection, social stigma, and fear of reinfection might perpetuate the development of anxiety and depression in patients. [Table/Fig-8] shows the prevalence rate of psychiatric morbidity in various studies in different countries [17,18,24-28,31-37].

Authors	Location and year of study	Sample size and methodology	Prevalence rate of psychiatric morbidity
Wang C et al., [24]	China 2020	This study included online survey using snowball sampling techniques covering 1210 respondents from 194 cities in China.	About three fourth of the Chinese population showed significant psychological impact in the form of depressive symptoms
Kong X et al., [25]	China 2020	A total of 144 admitted patients diagnosed with COVID-19 were included in this study.	34.72% and 28.47% patients with COVID-19 had symptoms of anxiety or depression, respectively.
Ma YF et al., [26]	China 2020	Online survey of 770 participants conducted in COVID-19 patients across five designated isolation hospitals for COVID-19.	Prevalence of depression among patients with COVID-19 was as high as 43.1%.
Li X et al., [27]	China 2020	A total of 99 COVID-19 patients were recruited and completed the Hospital Anxiety and Depression Scale (HADS) and the modified Medical Research Council (mMRC) Scale.	Mean score of anxiety symptoms in COVID-19 patients was 6.69±5.01 points during their hospitalisation, in which 26.3% and 15.2% of cases were borderline and abnormal. The depression score was 8.27±5.35 points, and the portion of borderline and abnormal cases was 21.2% and 29.3%, respectively.
Dai LL et al., [28]	China 2020	Three hundred seven COVID-19 patients who were admitted to JiangnanFangcang Shelter Hospital participated in this study.	The prevalence of anxiety and depressive symptoms were 18.6% and 13.4%, respectively.
Verma S and Mishra A, [32]	India 2020	Cross-sectional survey was conducted using an electronic questionnaire including 354 participants recruited through convenience sampling.	25%, 28% and 11.6% of the participants were moderate to extremely severely depressed, anxious and stressed, respectively.
Yadav R et al., [34]	India 2021	A hospital-based, cross-sectional study was done from June 2020 to August 2020 among 100 COVID-19 patients.	Depression was in 27%, anxiety in 67%, and sleep disturbance in 62% of patients.
Dar SA et al., [33]	India 2021	A cross-sectional, hospital-based study performed among 119 COVID-19 survivors.	Prevalence of anxiety, depression, and PTSD among COVID-19 survivors was n=53, 44.54%; n=73, 61.34%; and n=30, 25.21%, respectively.
Kumar P et al., [35]	India 2021	This cross-sectional study was conducted on 100 admitted COVID-19 patients.	48% patients had co-morbid depression.
Bharti P et al., [37]	India 2021	A cross-sectional study was conducted on 325 COVID-19 positive patients who were admitted in isolation ward	64% patients had depressive symptoms of different severity and 61% had anxiety symptoms.
Devi D et al., [18]	India 2021	A cross sectional study conducted in the post-COVID follow-up clinic including 534 participants.	Prevalence of depression and anxiety among post COVID-19 patients was 21.9% and 11.9%, respectively.
Prajapati NK et al., [31]	India 2021	This was a retrospective study covering 300 patients.	Adjustment disorder was the commonest psychiatric diagnosis (43%), followed by delirium (10%), depression (8.7%).
Chakrabarti S [36]	India 2021	A total of 635 hospitalised patients who were COVID-19 positive were requested to fill an online quality of life pre-validated questionnaire.	The prevalence of depression among hospitalised COVID-19 positive was nearly 40%.
Gaur V et al., [17]	India 2022	A cross-sectional single point observational study was conducted among clinically stable 72 COVID-19 infected patients.	Depression was the most common diagnosis in 44.44% of the patients, followed by anxiety in 34.72% in clinically stable patients of COVID-19.

[Table/Fig-8]: Literature compilation on prevalence of depression and anxiety in patients suffering from COVID-19 [17,18,24-28,31-37].

COVID-19 pandemic has taken a heavy toll on the mental health of the general public. The presence of psychiatric morbidity negatively influences the long-term outcome of COVID-19 patients. Hence, effective screening and robust consultation-liaison services are the need of the hour for the holistic management of such patients. This will not only help in the recovery of the patients, but will also help in improving the overall quality of life of such patients.

More follow-up multicentric studies are needed to study long-term sequelae of COVID-19 infection and causality. Moreover, sample should include migrant workers, healthcare professionals and other emergency service providers, children in order to have a better understanding of the dynamics and various correlates of psychiatric morbidity and COVID-19.

Limitation(s)

It was a single-centre, cross-sectional study. Hence, only associations could be studied. Recall bias and response bias can be present in cross-sectional studies. No long term follow-up of the patient was done, so information about long-term sequelae of COVID-19 is lacking. The present study was done at Rural Medical College, therefore, findings of the study cannot be generalised to the whole population. Other co-morbid medical illnesses and persisting symptoms of COVID-19 can act as confounding factors.

CONCLUSION(S)

Depression and anxiety were present in 37.50% and 41.66%, respectively in patients post COVID-19. Depression and anxiety were associated significantly with the presence of male gender, marital status, employment status, medical co-morbidity, the severity of illness and ICU admission. Hence, thorough evaluation and management of co-morbid psychiatric disorders in patients

with COVID-19 is the need of the hour. Additionally, psychological symptoms are known to linger in patients of COVID-19, even after recovery. Therefore, it is necessary to have a better understanding about the long-term psychological ramifications with COVID-19, in order to provide timely psychological interventions and effective rehabilitation for such patients.

REFERENCES

- Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: Implications for virus origins and receptor binding. *Lancet*. 2020;395(10224):565-74.
- Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, et al. Coronavirus disease 2019 (COVID-19): A perspective from China. *Radiology*. 2020;296(2):E15-E25.
- Reynolds DL, Garay JR, Deamond SI, Moran MK, Gold W, Styra R. Understanding, compliance and psychological impact of the sars quarantine experience. *Epidemiology and Infection*. 2007;136(7):997-1007.
- Dinakaran D, Manjunatha N, Naveen Kumar C, Suresh BM. Neuropsychiatric aspects of covid-19 pandemic: A selective review. *Asian J Psychiatr*. 2020;53:102188.
- Banerjee D, Viswanath B. Neuropsychiatric manifestations of COVID-19 and possible pathogenic mechanisms: Insights from other coronaviruses. *Asian J Psychiatr*. 2020;54:102350.
- Ran L, Wang W, Ai M, Kong Y, Chen J, Kuang L, et al. Psychological resilience, depression, anxiety, and somatization symptoms in response to COVID-19: A study of the general population in China at the peak of its epidemic. *Social Science & Medicine*. 2020;262:113261.
- Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. 2020;7(3):228-29.
- Guo Q, Zheng Y, Shi J, Wang J, Li G, Li C, et al. Immediate psychological distress in quarantined patients with covid-19 and its association with peripheral inflammation: A mixed-method study. *Brain, Behavior, and Immunity*. 2020;88:17-27.
- Hickie I, Bennett B, Lloyd A, Heath A, Martin N. Complex genetic and environmental relationships between psychological distress, fatigue and immune functioning: A twin study. *Psychological Medicine*. Cambridge University Press. 1999;29(2):269-77.
- Lee CH, Giuliani F. The role of inflammation in depression and fatigue. *Frontiers in Immunology*. 2019;10:1696.

- [11] Loimal M. 20% increase in patients with mental illness since coronavirus outbreak: Survey. India Today. 2020 Aug. <https://www.indiatoday.in/india/story/20-percent-increase-in-patients-with-mental-illness-since-coronavirus-outbreak-survey-1661584-2020-03-31>.
- [12] Bajaj S, Blair KS, Schwartz A, Dobberty M, Blair RJR. Worry and insomnia as risk factors for depression during initial stages of COVID-19 pandemic in India. PLoS ONE. 2020;15(12):e0243527.
- [13] Majumdar P, Biswas A, Sahu S. Covid-19 pandemic and lockdown: Cause of sleep disruption, depression, somatic pain, and increased screen exposure of office workers and students of India. Chronobiology International. 2020;37(8):1191-1200.
- [14] Roy A, Singh AK, Mishra S, Chinnadurai A, Mitra A, Bakshi O. Mental health implications of COVID-19 pandemic and its response in India. International Journal of Social Psychiatry. 2020;67(5):587-600.
- [15] Arab-Zozani M, Hashemi F, Safari H, Yousefi M, Ameri H. Health-related quality of life and its associated factors in COVID-19 patients. Osong Public Heal Res Perspect. 2020;11(5):296-02.
- [16] Algahtani FD, Hassan SN, Alsaif B, Zrieq R. Assessment of the quality of life during COVID-19 pandemic: A cross-sectional survey from the Kingdom of Saudi Arabia. Int J Environ Res Public Health. 2021;18(3):847.
- [17] Gaur V, Salvi D, Gautam M, Sangwan V, Tambi T, Kalia A, et al. Psychiatric comorbidity in clinically stable COVID-19 patients. Indian J Psychiatry. 2022;64:89-92.
- [18] Devi D, Monica V, Santosh R, Vijaya Raghavan, Poomachandrika P. Psychological morbidity among post-COVID-19 patients: A cross-sectional study from Chennai, South India. Indian Journal of Mental Health and Neurosciences. 2021;4(1):10-17.
- [19] NIC LP. Ministry of Education. Major Initiatives. Available from: <https://www.education.gov.in/en/statistics-category-new/indian-standard-classification-education-insced>.
- [20] Clinical management protocol: COVID-19-MoHFW [Internet]. Available from: <https://www.mohfw.gov.in/pdf/ClinicalManagementProtocolforCOVID19dated27062020.pdf>.
- [21] The ICD-10 classification of mental and behavioural disorders: Diagnostic Criteria for Research. World Health Organization. World Health Organization; [cited 2022 Aug 29]. Available from: <https://www.who.int/publications-detail-redirect/9241544554>.
- [22] Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960;23(1):56-62.
- [23] Hamilton M. The assessment of anxiety states by rating. Br J Med Psychol. 1959;32(1):50-55.
- [24] Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17(5):01-25.
- [25] Kong X, Zheng K, Tang M, Kong F, Zhou J, Diao L, et al. Prevalence and factors associated with depression and anxiety of hospitalized patients with COVID-19. MedRxiv. 2020.20043075. Doi: <https://doi.org/10.1101/2020.03.24.20043075>.
- [26] Ma YF, Li W, Deng HB, Wang L, Wang Y, Wang PH, et al. Prevalence of depression and its association with quality of life in clinically stable patients with COVID-19. J Affect Disord. 2020;275:145-48.
- [27] Li X, Tian J, Xu Q. The associated factors of anxiety and depressive symptoms in COVID-19 patients hospitalized in Wuhan, China. Psychiatric Quarterly. 2020;92(3):879-87.
- [28] Dai LL, Wang X, Jiang TC, Li PF, Wang Y, Wu SJ, et al. Anxiety and depressive symptoms among COVID-19 patients in Jiangnan Fangcang Shelter Hospital in Wuhan, China. PLoS ONE. 2020;15(8):e0238416.
- [29] Tufan A, Guler AA, Matucci-Cerinic M. COVID-19, immune system response, hyperinflammation and repurposing anti-rheumatic drugs. Turkish Journal of Medical Sciences. 2020;50(SI-1):620-32.
- [30] Fitzgerald PJ. Serious infection may systemically increase noradrenergic signaling and produce psychological effects. Medical Hypotheses. 2020;139:109692.
- [31] Prajapati NK, Parikh NC, Shah ND, Darji VM, Jariwala HB, Miroliya MT. Evaluation of psychiatric morbidity in COVID-19-positive inpatients referred to Consultation Liaison Psychiatry in a tertiary care hospital. Indian Journal of Psychological Medicine. 2021;43(4):330-35.
- [32] Verma S, Mishra A. Depression, anxiety, and stress and socio-demographic correlates among general Indian public during COVID-19. The International Journal of Social Psychiatry. 2020;66(8):756-62.
- [33] Dar SA, Dar MM, Sheikh S, Haq I, Azad AM, Mushtaq M, et al. Psychiatric comorbidities among COVID-19 survivors in North India: A cross-sectional study. J Edu Health Promot. 2021;10:309.
- [34] Yadav R, Yadav P, Shukla S, Kumar R. Assessment of depression, anxiety, and sleep disturbance in COVID-19 patients at tertiary care centre of North India. J Neurosci Rural Pract. 2021;12:316-22.
- [35] Kumar P, Chaudhary R, Chhabra S, Bhalla JK. Prevalence of anxiety and depression among COVID-19 patients admitted to tertiary care hospital. Indian J Soc Psychiatry. 2021;37:88-92.
- [36] Chakrabarti S. Mental health in hospitalised COVID 19 patients in quarantine during second wave in a South Indian Private Teaching Hospital. J Multidiscip Health. 2021;14:2777-89.
- [37] Bharti P, Agrawal BK, Gupta P, Singla M, Garg LN, Mittal A, et al. Psychological impact among COVID-19 positive patients in a tertiary care hospital: A cross-sectional study. J Clin Diagn Res. 2021;15(2):VC10-VC13.
- [38] Iqbal Y, Al Abdulla MA, Albrahim S, Latoo J, Kumar R, Haddad PM, et al. Psychiatric presentation of patients with acute SARS-COV-2 infection: A retrospective review of 50 consecutive patients seen by a consultation-liaison psychiatry team. BJPsych Open. 2020;6(5):e109.
- [39] Hou F, Bi F, Jiao R, Luo D, Song K. Gender differences of depression and anxiety among social media users during the COVID-19 outbreak in China: A cross-sectional study. BMC Public Health. 2020;20(1):01-11.
- [40] Idowu OM, Adaramola OG, Aderounmu BS, Olugbamigbe ID, Dada OE, Osifeso AC, et al. A gender comparison of the psychological distress of medical students in Nigeria during the coronavirus pandemic: A cross-sectional survey. medRxiv. 2020. Doi: [10.1101/2020.11.08.20227967](https://doi.org/10.1101/2020.11.08.20227967).
- [41] Verma R, Balhara YP, Gupta CS. Gender differences in stress response: Role of developmental and biological determinants. Industrial Psychiatry Journal. 2011;20(1):04-10.
- [42] Sethi BB, Chaturvedi PK. A review and role of family studies and mental health. Indian J Soc Psychiatry. 1985;1(17):216-30.
- [43] Sinha D. Some recent changes in the Indian family and their implications for socialization. Indian J Soc Work. 1984;45(3):271-86.
- [44] Sharma R. Revised Kuppuswamy's Socioeconomic Status Scale: Explained and Updated. Indian Pediatr. 2017;54:867-70.
- [45] Arbelo N, López-Pelayo H, Sagué M, Madero S, Pinzón-Espinosa J, Gomes-da-Costa S, et al. Psychiatric clinical profiles and pharmacological interactions in COVID-19 inpatients referred to a consultation liaison psychiatry unit: A cross-sectional study. Psychiatric Quarterly. 2021;92(3):1021-33.
- [46] Moghanibashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. Asian J Psychiatr. 2020;51:102076.
- [47] Hyland P, Shevlin M, McBride O, Murphy J, Karatzias T, Bentall RP, et al. Anxiety and depression in the Republic of Ireland during the COVID-19 pandemic. Acta Psychiatr Scand. 2020;142(3):249-56.

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