Research Report

PREVALENCE AND DETERMINANTS OF ANXIETY AND DEPRESSION AMONG INDIVIDUALS ADMITTED WITH COVID-19 INFECTION IN A TERTIARY LEVEL HOSPITAL

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ABSTRACT

Background: The COVID 19 pandemic is associated with mental health concerns such as anxiety and depression at multiple levels and has recently been postulated to be linked to the long COVID syndrome. **Objectives:** To determine the prevalence and factors associated with depression and anxiety in individuals admitted with COVID-19 infection. **Methods:** 154 individuals admitted with COVID-19 infection were screened for depression and anxiety employing PHQ9 and GAD 7, respectively. Trained interns did the screening on consecutively admitted patients. **Results:** The proportion of depression and anxiety was 26.6%(n=41) and 20.1%(n=31), respectively. Moderate and above symptoms were present in 3.9% of the individuals(n=6) on both scales. Older age (t=2.124, p=.035), lower educational status (t=3.725, p=0.000), a family member losing their job during the pandemic (t=1.91, p=0.05), presence of fever (t=2.069, p=0.040), oxygen therapy (t=2.19, p=0.030) and treatment with hydroxychloroquine (t=2.122, p=0.035) were found to be significantly associated with high depression scores. Being less educated (t=3.594,p=0.000), admission under non-paying status (t=2.209, p=0.029), a family member losing their job during the COVID pandemic (t=1.946, p=0.05), presence of non-productive cough (t=1.940, p=0.05), fatigue (t=2.418, p=0.017)), myalgia (t=2.015, p=0.046), having Diabetes Mellitus (t=2.151, p=0.033) and requiring oxygen therapy (t=2.030, p=0.040) were significant risk factors for higher anxiety scores. **Conclusions:** The feasibility of screening for depression and anxiety by non-mental health professionals in poorly technology-enabled moderately ill inpatient populations within LAMIC settings have been demonstrated. Psychosocial disadvantage and indicators of relatively severe covid infection seem to be risk factors for depression and anxiety. A system for screening for these disorders employing feasible strategies should ideally be incorporated to mitigate both short term and long-term negative consequences of this pandemic, particularly in inpatient populations, who are already subject to various vulnerabilities.

Keywords: COVID-19, anxiety, depression, determinants

INTRODUCTION

The COVID-19 pandemic has been relentless, with a recent surge of cases and deaths in the state of Kerala, India[1,2]. Depression and anxiety have been detected to have increased rates both in the general population[3,4,5,6], frontline workers[7,8] and individuals infected with frontline workers[7,8] and individuals infected with

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COVID-19.[9,10] Some of the causes for increased rates within COVID-19 infected individuals are stigma, fear of complications, presence of physical symptoms, social isolation, etc.[10,11] There have been cases of suicidality and completed suicides within hospital settings in the country. Depression and anxiety can significantly worsen medical outcomes and cause severe distress. Therefore, there is a need to examine ways to detect anxiety and depression within this vulnerable population.

Corona Virus Disease (COVID-19) is caused by the highly transmissible coronavirus known as Severe Acute Respiratory Syndrome Corona Virus 2 (SARS CoV-2). It was first identified in Wuhan, China, in Dec 2019 and spread at a fast rate worldwide. COVID-19 can cause a varied spectrum of clinical presentations ranging from asymptomatic or mild symptoms like fever, headache, myalgia, sore throat, anosmia to the more severe and life-threatening complications that may include pneumonia, Acute Respiratory Distress Syndrome (ARDS), myocarditis, stroke, encephalitis, multi-organ failure, and even death.[12] Coronaviruses tend to be associated with a spectrum of neuropsychiatric manifestations. The mechanisms proposed for these manifestations are direct central nervous system infiltration, cytokine network dysregulation, post-infectious autoimmunity, etc.[13] In addition to this, psychosocial factors such as isolation, stigma and fear of death may be contributory.[14] Studies show that 22·5% of patients with COVID-19 have a concurrent neuropsychiatric diagnosis[12] and of these, up to 60% are a psychiatry disorder according to a study published in the lancet in Oct 2020.[14] The link between depressive and anxiety symptoms such as poor concentration, fatigue and low mood and the long covid syndrome is also becoming apparent.[15]

In a study done in China in March 2020, 18.57%, 13.36%, and 84.69% had anxiety symptoms, depressive symptoms, and poor sleep quality, respectively. In addition, there were more severe levels of anxiety, and depressive symptoms among COVID-19 patients admitted to Fangcang hospitals in Wuhan. Those with more physical symptoms and poor sleep quality demonstrated more vulnerability to anxiety symptoms. Females, patients with family members diagnosed with COVID-19, and patients with more current physical symptoms were more vulnerable to depressive symptoms.[16]

There is a significant proportion of COVID-19 infected individuals with neuropsychological complications such as depression and anxiety. Suicidal ideation and completed suicide are also reported, and an understanding regarding aetiological factors are essential for planning services. Therefore, we would like to determine the prevalence and determinants of anxiety and depression among inpatients with COVID-19 infection.

MATERIALS AND METHODS

Study Design: Cross-sectional study design was employed

Study Setting: Covid care wards (general/pay ward) in the Dr Somervell Memorial Medical College Hospital. Dr SMCSI MCH, established in 2002, is at Karakonam, a village on the southern border of the Thiruvananthapuram District of the State of Kerala. The hospital has various departments offering comprehensive outpatient and inpatients services. The COVID care centre had 10 ICU beds, 10 High Dependency Units (HDU) beds and 130 ward beds. Multidisciplinary multimodal care was provided in these ward settings.

Study Period: From 1st December 2020 to 31st January 2021.

Study Population: Individuals with COVID-19 infection admitted to Dr Somervell Memorial Medical College, Karakonam.

Inclusion Criteria:

1. Individuals fulfilling the criteria for COVID-19 infection
2. Patients aged above 18years of age

Exclusion Criteria:

1. Patients with serious complications requiring ICU admission or ventilation
2. Patients refusing consent

Sample Size

The sample size was calculated considering a 30% chance of depression or anxiety[16] in this inpatient population, using the formula, $n = 4pq/d^2$. The sample size estimated was 201. Hence, approximately a sample size of 210 was planned.

Tools for assessment

1. A Semi-structured proforma with information on the gender, age, duration of symptoms, duration from the time of diagnosis, medical comorbidities, presence of symptoms and methods of intervention was employed.
2. Patient Health Questionnaire (PHQ-9) to assess the severity of symptoms of depression. PHQ-9 is a nine-item tool, and the validated Malayalam version of PHQ 9 was employed.[17] It has been used for measuring depression both in clinical and general population settings. Each of the nine items is scored as 0 (not at all), 1 (several days), 2 (more than half of the days), or 3 (nearly every day). The total score for PHQ-9 ranges from 0 to 27. PHQ-9 scores were categorised using a cutoff score of ≥5, indicating the presence of any depressive symptoms and a cutoff score of ≥10 for the presence of moderate to severe depression.[18]
3. The generalised anxiety disorder (GAD-7) questionnaire is a validated seven-item scale frequently employed in India.[19,20] Each of these seven items is scored as 0 (not at all), 1 (several days), 2 (more than half of the days), or 3 (nearly every day). The total score for the GAD-7 ranges from 0 to 21. We used a cutoff score of ≥5 indicating the presence of any anxiety symptoms and a cutoff score of greater than 8 for the presence of moderate to severe anxiety.[21]

The study instruments, except the PHQ-9, were translated and back-translated employing standardized techniques into the Malayalam language.

Procedure for data collection

Consecutive patients fulfilling the inclusion criteria were selected for the study. The patients were screened by trained interns employing the PHQ 9 and GAD 7 between 48-72 hours after admission after obtaining informed consent. Information regarding the covid related symptoms and comorbidities were also extracted from the records. The data was collected by the interns posted in the covid care wards who read out the questions employing a predesigned google form on a designated mobile phone. The interns were trained in small groups on the administration of GAD 7 & PHQ 9 by the faculty and residents of the psychiatry department. The data was passed on to the psychiatry department via electronic means on the same working day. Individuals who screened positive for either depression or anxiety were interviewed via teleconsultation by residents (junior or senior) of the psychiatry department on the next working day or the same day if any severe distress is detected. A diagnosis, if present, was made as per the ICD 10 clinical guidelines. Patients requiring intervention were given appropriate management as per department protocols for COVID positive patients.

Statistical analysis

Data were entered into an excel sheet and analysed using SPSS version 16. Primary analysis involved descriptive statistics for estimating the socio-demographic and clinical variables, with categorical variables expressed as numbers and percentages, while continuous variables were described employing mean and standard deviations. Students t-test was conducted to examine the determinants of high depressive and anxiety scores.

Ethical considerations

This study was conducted after obtaining ethics committee clearance. Informed consent was sought from the subjects before recruitment into the study. Confidentiality was always ensured, identifiers were removed before data entry, and coded data was stored safely on a password-protected laptop to ensure privacy. When the patients were detected to have a clinical syndrome with significant symptoms causing distress, appropriate management as per prescribed guidelines was given after obtaining informed consent from the patient and family. Permission to conduct the study was sought and obtained from the medical superintendent and the nodal officer in charge of the COVID care wards.

RESULTS

Only 154 patients were assessed as the covid care centre was discontinued following the tapering of the first COVID wave in Kerala. Socio-demographic and clinical variables of the participants are summarised in Table.1 and 2, respectively.

Prevalence of Anxiety and Depression

41 (26.6%) individuals admitted with COVID-19 had scores indicating depression on PHQ9 (≥5), of which 5

(3.2%) had moderate & one individual had severe depression (0.6 %). The mean score of depression was 3.47 (+±3.161).

(20.1%) individuals admitted with COVID-19 had scores indicating anxiety on GAD7(≥5), of which six individuals (3.9%) had moderate anxiety. The mean scores of anxiety were 2.71(±2.703). (Table.3)

Table I-Sociodemographic and COVID related Variables of Inpatients(n=154)

Variables	Categories	n (%)
Age	>/=60 yrs	81(52.6)
	<60yrs	73(47.4)
Sex	Male	82(53.2)
	Female	72(46.8)
Education	Illiterate	33(21.4)
	High school& above	121(78.6)
Marital status	Married	137(89)
	Unmarried	11(7.1)
	Separated/Divorced	6(3.9)
Occupation	Employed	78(50.6)
	Unemployed	76(49.4)
Profession	Nil	76(49.4)
	Skilled	29(18.8)
	Semiskilled	49(31.8)
Residence	Rural	114(74)
	Urban & Semi urban	40(26)
Socioeconomic status	Low	85(55.2)
	Middle & High	69(44.8)
Admission	Paying	16(10.4)
	Non-Paying	138(89.6)
No of family members affected with the disease	Affected	113(73.4)
	Non-affected	41(23.6)
Lost job due to COVID	Affected	58(37.7)
	Non affected	96(62.3)
Any family member lost job due to COVID	Affected	83(53.9)
	Non– affected	71(46.1)
Financial stressors due to COVID	Affected	132(85.7)
	Non affected	22(14.3)

Factors associated with depression among individuals admitted with COVID-19

Depression scores were significantly higher in those who were older (age > 60) (t=2.214; p=0.035), less educated (t=3.725; p<0.001) (Table. 4) and among whom family member's job was lost due to the fallout of the COVID-19 pandemic (t=1.91, p=0.05). Individuals who had fever as a clinical feature of COVID-19 Table 2. Clinical and treatment Variables of Inpatients (n=154)

Variables	n (%)
Fever	117(76)
Cough-Productive	80(51.9)
Cough-nonproductive	21(13.6)
Sore throat	52(33.8)
Nasal congestion	36(23.4)
Loss of smell	29(18.8)
Headache	54(35.1)
Fatigue	75(48.7)
Chest pain	8(5.2)
Diarrhea	9(5.8)
Abdominal pain	11(7.1)
Myalgia/Arthralgia	55(35.7)
COPD/Asthma/Bronchitis	25(16.2)
Diabetes Mellitus	74(48.1)
Systemic Hypertension	63(40.9)
Cardiovascular disease	22(14.3)
CVA	7(4.5)
Chronic Renal disease	1(0.6)
Oxygen	21(13.6)
HCQ	8(5.2)
Steroids	34(22.1)

Table 3. Depression and anxiety in individuals admitted with COVID-19 infection

Variable		n (%)	
Depression present	Mild	35 (22.7%)	41(26.6%)
	Moderate	5 (3.2%)	
	Severe	1 (0.7%)	
Anxiety present	Mild	25 (16.2%)	31(20.1%)

(t=2.069; p=0.040), who had to take oxygen as treatment (t=2.19; p=0.030), who had to take Tab. Hydroxychloroquine as treatment during admission for COVID-19 (t=2.122; p=0.035) were also significantly likely to have higher depression scores. (Table. 4)

Factors associated with anxiety among individuals admitted with COVID-19

Anxiety scores were significantly higher in those who were less-educated (t=3.594; p<0.001) and non-paying (t=2.209; p =0.029) (Table.5). Individuals whose family

Table 4. Factors significantly associated with depression among individuals admitted with COVID-19 infection

Variables		Depression score (mean ± SD)	t-value	P-value
Age	≥60 yrs	3.98±3.51	2.124	0.035
	<60yrs	2.9±2.63		
Educational Status	Illiterate	5.21±3.71	3.725	0.000
	High school& above	2.99±2.83		
Family members lost their job due to COVID-19	Affected	3.92±3.27	1.91	0.05
	Non-affected	2.94±2.97		
Had fever as a clinical feature of COVID-19	Yes	3.76±3.183	2.069	0.040
	No	2.54±2.94		
Had to take oxygen as treatment during admission for COVID-19	Yes	4.86±3.62	2.19	0.030
	No	3.25±3.04		
Had to take Tab. Hydroxychloroquine as treatment during admission for COVID-19	Yes	5.75±5.17	2.122	0.035
	No	3.34±2.99		

Table 5. Factors significantly associated with depression among individuals admitted with COVID-19 infection

Variables		Anxiety score (mean ± SD)	t -value	p-value
Educational status	Illiterate	4.15±3.43	3.594	0.000
	High school& above	2.31±2.34		
Type of admission in the COVID ward	Non-Paying (Insurance)	2.87±2.77	2.209	0.029
	Paying	1.31±1.40		
Family members lost job due to COVID-19	Affected	3.10±2.85	1.946	0.05
	Non-affected	2.25±2.47		
Had nonproductive cough as a clinical feature of COVID-19	Yes	3.76±2.72	1.940	0.05
	No	2.54±2.43		
Had fatigue as a clinical feature of COVID-19	Yes	3.24±3.13	2.418	0.017
	No	2.20±2.12		
Had myalgia as a clinical feature of COVID-19	Yes	3.29±2.67	2.015	0.046
	No	2.38±2.68		
Diabetes Mellitus as a comorbidity	Yes	3.19±2.95	2.151	0.033
	No	2.26±2.39		
Had to take oxygen as treatment during admission for COVID-19	Yes	3.81±2.27	2.030	0.044
	No	2.53±2.73		

member's job was affected due to the strictures related to the COVID-19 pandemic (t=1.946; p=0.05) had higher anxiety scores. Clinical features such as nonproductive cough (t=1.940; p=0.05), fatigue (t=2.418; p=0.017) & myalgia (t=2.015; p=0.046) were also significantly associated with anxiety scores. The presence of Diabetes Mellitus (t=2.151; p=0.033) and oxygen therapy (t=2.030; p=0.044) were also associated with anxiety. (Table.5)

DISCUSSION

Prevalence of Anxiety and Depression

26.6% and 20.1% of the individuals had evidence of depression (PHQ-9) and anxiety (GAD-7), while only 3.9 % had moderate and above symptoms on either scale. By clinical convention, individuals with moderate and above symptoms on the two instruments are considered as warranting clinical attention, according to experts.[22]

These proportions are lower than those reported in a hospital-based study from Wuhan in 2020, with 144 individuals with 34.72% and 28.47% with depression and anxiety.[23] The current investigation was conducted in late 2020, unlike other studies conducted in early 2020, when stigma & fear related to COVID-19 were paramount. Most of the patients were in general ward settings in our centre, where they were potentially less isolated than private room settings. Further, during the study period in Kerala, India, there were relatively better resources for managing the COVID-19 infection, unlike the situation that emerged during the second COVID-19 wave in India, which was overwhelming at multiple levels.[24] India recorded relatively low mortality rates during the first wave in 2020[25], possibly also leading to lower rates of depression and anxiety in this sample.

Prevalence rates reported in Eun Kyo Kang et al. from Korea,[26] is comparable with our study. They had a prevalence rate of 24.3% for depression and 14.9% for anxiety (PHQ-9 & GAD-7 scores >5). Considering the prevalence of moderate depression and anxiety (PHQ-9 & GAD-7 scores>10) during the first week, they had a prevalence of 6.5% & 1.8%, respectively (26), with 3.9%(N=6)& 3.9%(N=6) of individuals in our study having moderate symptoms.

Relatively comparable rates of emotional distress during the 1st week of admission in Kerala compared to a developed country like Korea may also be due to the care at multiple levels, both in the community & treatment centres and coordinated management strategies by the Kerala government. Individuals with COVID infection also received calls offering psychosocial support, which might have further ameliorated symptoms.[27] However, during the second COVID wave in 2021, the picture is somewhat different in India. There was a significant increase in cases[28] which led to a scarcity of resources at multiple levels, resulting in higher rates of distress, mortality &morbidity[24,] with resources often being inadequate. One may postulate that the levels of anxiety and depression are likely to have been much higher.

Factors associated with depression

In this investigation, depression scores were significantly higher in older, less educated individuals whose family member's job affected, and clinical indicators such as fever, being on oxygen therapy & hydroxychloroquine as treatment during admission.

Older and less educated individuals also had higher depression scores in a study by Kong et al. in Wuhan, bringing to the fore that these preexisting demographic vulnerabilities for common mental disorders[29]continue to impact on individuals with COVID-19 infection requiring admission. A family member losing their job during the pandemic/lockdown period was associated with high depressive scores. One of the devastating socioeconomic consequences of the pandemic has been the loss of livelihood means.[30] In India, due to the stringent and prolonged lockdown measures imposed in 2020, there was a widespread impact on employment, particularly in semi-rural areas where most of the working population were informally employed.[31] Further, in low middle-income countries such as India, the absence of well-established social security schemes in the face of unemployment may compound the situation for dependent family members. This brings to the fore the wider negative impact of the secondary consequences of the pandemic, and to our knowledge, this aspect has not been adequately explored in other studies.

In the study from Wuhan, China, by Dai et al., female sex, a family member infection with COVID-19 and having more current physical symptoms were

independent risk factors for depression.[16] Our study also showed that physical symptoms (fever) were a significant risk factor for depression. In a study conducted in Taiwan by Putri et al. in 109 eligible individuals during admission for COVID-19, a higher number of physical symptoms were predictive of psychological distress.[32] As early as the 1970s, Weissman noted that females were more likely to experience depression than males.[33] But we could not establish female sex as a significant risk factor for depression in our study.

Oxygen treatment, which was detected as a risk factor, may be a proxy for poor oxygen saturation and hypoxia. The findings of oxygen and Hydroxychloroquine treatment being significantly associated with the presence of depression may indicate that these are proxy indicators of severe disease rather than the actual use of these therapeutic techniques itself. However, quinolones such as hydroxychloroquine are associated with neuropsychiatric side effects, and this etiological possibility cannot be ruled out.

Factors associated with anxiety

In our study, anxiety scores were significantly higher in less-educated, non-paying individuals, those whose family member's job was affected, and those with clinical features such as nonproductive cough, fatigue, & myalgia. Individuals who had Diabetes Mellitus and those on oxygen therapy also scored high on the GAD-7 scale.

In the study by Dai et al. in Wuhan, poor sleep quality and the presence of 2 or more current physical symptoms were independent risk factors for anxiety.[16] Similar findings were reported from Taiwan in a sample of 109 patients admitted in a hospital setting.[32] Symptoms such as nonproductive cough, fatigue & myalgia were associated with high anxiety scores in our study. This is understandable as individuals with symptoms are more likely to ruminate on the significance of these symptoms. Conversely, it may be argued that autonomic symptoms of anxiety may mimic typical symptoms of COVID-19 infection.

As was detected in the current investigation, older, less educated individuals & low oxygen saturation were independent risk factors for anxiety in a study from Shanghai, China.[23] We did not record oxygen saturation; however, receiving oxygen therapy, a proxy indicator of low saturation levels, was associated with anxiety. These results indicate that patients with more severe illnesses are more likely to be anxious and require intervention over and above routine care. Previous psychiatric history & COVID-19 stigma was associated with Depression and Anxiety in a study from Korea.[26] We did not examine these factors in our study.

Risk factors for the Long covid syndrome are reported to be similar to those detected in this investigation, such as a greater number of physical symptoms evidence of dyspnoea. Depression and anxiety during COVID-19 infection can also be postulated to be a risk factor for Long covid syndrome through biological, immunological and psychosocial mechanisms

Strengths

Our study demonstrated the feasibility of training junior level non-mental health professionals interns to collect data regarding anxiety and depression in a difficult clinical setting. Well validated standardised instruments were used in our study. A range of putative risk factors for anxiety and depression were examined.

Limitations

The full sample could not be recruited as the COVID ward was discontinued by early 2021, and this could have potentially affected the power of the study and our findings. The scales detecting depression PHQ-9 while being a well-validated standard scale include the items "feeling tired or having little energy", poor appetite or overeating", "trouble falling or staying asleep or sleeping too much" and may elicit symptoms which overlap with those directly attributable to COVID-19 infection. This study was single centred; therefore, generalizability will be low. We only collected data at one point (2-3 days after admission); thus, it did not examine changes during the admission. This investigation was cross-sectional, and therefore causality cannot be fully established. Our study did not examine the previous psychiatric history, stigma related to COVID-19, social support, etc. were not examined as associated factors for anxiety or depression.

CONCLUSIONS

The COVID-19 pandemic is likely to be ongoing for the next few years. Understanding mental health consequences of individuals in a high-risk category requiring inpatient care are sparse. This can be

attributable to understandably prioritising physical care in these difficult situations. Given the possible long-term consequences of clinical anxiety and depression, there is a need to identify both the syndrome and the factors that increase its likelihood in low and middle-income countries. Besides demographic and clinical variables, the economic consequences of the pandemic era also seem to be aetiological. If possible, a system for screening for these disorders employing easy to use strategies should ideally be incorporated to mitigate both short term and long-term negative consequences of this pandemic, particularly in inpatient populations, who may have added vulnerabilities.

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None declared.

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