

Neuropsychiatric Manifestations of COVID-19: An Online Survey

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Received on: 11 April 2022; Accepted on: 30 December 2022; Published on: 10 February 2023

ABSTRACT

Background: Coronavirus disease-2019 (COVID-19) is known to cause neuropsychiatric sequelae. However, there is dearth of data regarding the same from this subcontinent.

Aim and objectives: To determine the prevalence of neuropsychiatric symptoms among patients who recovered from COVID-19 illness.

Materials and methods: It was an online survey that was conducted by using Google form with link sent by using WhatsApp to subjects who suffered and recovered from COVID-19 illness. The online survey was done through a 71-item self-designed questionnaire. It took around 10 minutes to complete the questionnaire. In total, 250 responses were received.

Results: A typical subject was male (63.2%), healthcare provider (33.6%), Hindu (96.4%) by religion, and from urban background (74%). Nearly about two-fifths (43.2%) and one-fifth (20.8%) of the subjects had comorbid physical and psychiatric disorders, respectively. Majority of the subjects had COVID-19 illness in the past 1 month. Nearly about one-sixth (17.6%) of the subjects lost somebody in their family due to COVID-19. Majority (59.2%) of the subjects experienced persistent fatigue after recovering from COVID-19. Nearly about one-third of the subjects experienced persistent low mood (34.8%), sleep difficulty (38.8%), anxiety symptoms (39.6%), irritability (34.4%), difficulty in concentrating (39.6%), and forgetfulness (30.8%). Nearly about one-sixth of the subjects had panic attacks (18.4%), flashback of illness (16%), obsessive-compulsive symptoms (18.8%), and sexual difficulty (16%) after recovering from COVID-19. Nearly half of the subjects became more preoccupied about bodily symptoms (45.6%), became more anxious on reading COVID-19-related news (45.2%), and hence avoided the same (49.6%). Nearly about one-fifth of the subjects had persistent loss of smell (25.6%), taste (20.4%), and brain fog (26.4%). A miniscule proportion of the subjects had new-onset headache (15.2%), giddiness (12%), and tremor of hands (9.6%).

Conclusion: The index survey suggested that neuropsychiatric symptoms are quite prevalent after recovering from COVID-19 illness.

Keywords: Coronavirus disease, Neuropsychiatric, Psychiatric, Symptoms.

Indian Journal of Private Psychiatry (2023); 10.5005/jp-journals-10067-0136

INTRODUCTION

Coronavirus infection or COVID-19 outbreak has created a havoc on mankind in recent times. The COVID-19 infection outbreak began in China in December 2019 and spread to almost all the countries of the world by February 2020.¹ The World Health Organization (WHO) declared it as a pandemic on 11th March, 2020, and as on 8th April, 2022, nearly about 494 million cases were confirmed and more than 6.1 million people died (WHO website dated 8.4.2022 at 11:00 am Indian standard time) across 204 countries and this number is likely to rise.¹ Currently India is recovering from third wave of the pandemic. As a result of this pandemic, India along with other parts of the world has witnessed an economic meltdown, job losses, unemployment, overburdened and often crumbling health infrastructure, and closure of educational institutes. Various studies have reported the psychological impact of this pandemic on vulnerable population, e.g., children, elderly, homeless, migrant workers, and frontline workers, including healthcare professionals.²⁻⁸

Though SARS-CoV-2 is primarily a respiratory virus, its neurotropism is not unknown. Viral particles have been detected in postmortem sections of the pyriform cortex, basal ganglia, and hypothalamus.⁹ Both hematogenous spread as well as spread through olfactory bulb have been reported.¹⁰ Various possible mechanisms for neuropsychiatric manifestations of SARS-CoV-2

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How to cite this article: Chakraborty K, Chatterjee M, Neogi R, et al. Neuropsychiatric Manifestations of COVID-19: An Online Survey. *Ind J Priv Psychiatry* 2023;17(1):26-33.

Source of support: Nil

Conflict of interest: Dr Gautam Saha is associated as the Patron of this journal, and this manuscript was subjected to this journal's standard review procedures, with this peer review handled independently of Dr Gautam Saha and his research group.

have been postulated, e.g., direct injury through blood circulation or neuronal route, hypoxic injury, dysregulated immunomodulation, immune cell migration to central nervous system, ACE-2 and CoV spike protein interaction, and autoimmunity.^{11,12}

A host of neuropsychiatric manifestations have been reported among COVID-19-infected patients ranging from delirium,¹³ dysfunction of taste and olfaction sensation,¹⁴ acute psychosis and manic disorders,^{15,16} encephalitis,¹⁷ ischemic strokes,¹⁸ depression, acute stress reaction, somatization, adjustment disorders, anxiety, obsessive-compulsive disorders,¹⁹ and Parkinsons-like features to new-onset seizure.²⁰

In a sample of 40,469 COVID-19 patients, the prevalence of neuropsychiatric symptoms was found to be 22.5%. The symptoms in decreasing order of frequency were as follows – headache (3.7%), sleep disturbances (3.4%), encephalopathy (2.3%), myalgia (2.0%), loss of taste and smell (1.2%), stroke and transient ischemic attack (1.0%), and seizures 258 (0.6%). A minuscule proportion of subjects suffered from anxiety and related disorders (4.6%), mood disorders (3.8%), and suicidal ideation (0.2%).²¹ In a study from China that included 119 subjects, the prevalence of generalized anxiety symptoms was (51.3%), depressive symptoms (41.2%), and post-traumatic stress symptoms (33.6%).²² In a study of 77 COVID-19-infected patients, 18 (23.4%) presented with neuropsychiatric symptoms such as numbness, tremor, hyposmia, restless leg syndrome, suicidal ideation, hallucination, agitation, paranoia, and insomnia.²³ A systematic review and meta-analysis published in Lancet found that, in the post-illness stage, insomnia (12.1%), depressed mood (10.5%), irritability (12.8%), memory impairment (18.9%), anxiety (12.3%), traumatic memories (30.4%), fatigue (19.3%), and sleep disorder (100%) were common. The meta-analysis indicated that in the post-illness stage, the point prevalence of post-traumatic stress disorder was 32.2%, depression was 14.9%, and that of anxiety disorders was 14.8%.²⁴ A study by Varatharaj et al. reported that 10 (43%) out of 23 patients with neuropsychiatric disorders following COVID-19 had new-onset psychosis, 6 (26%) had a neurocognitive (dementia-like) syndrome, and 4 (17%) had an affective disorder.²⁵

There is dearth of Indian studies that systematically investigated the prevalence of neuropsychiatric manifestations in persons who recovered from COVID-19 illness. Therefore, the index study aimed at finding the prevalence of neuropsychiatric symptoms among patients who recovered from COVID-19 illness. The study also attempted to collect vaccination data against SAR-CoV-2 in this population and investigated other COVID-19 illness-related factors.

AIMS AND OBJECTIVES OF THE STUDY

The aim of the study was to determine the prevalence of neuropsychiatric symptoms among patients who recovered from COVID-19 illness.

MATERIALS AND METHODS

This online survey was conducted by using Google form with link sent by using WhatsApp. Google form has the advantage of submitting the response without disclosing the identity. The person who created the form can only see the responses but not the name of the sender (provided the option of name is included in the form). The form was sent in WhatsApp groups as well as individually to persons (nearly about 5000 people) who were in the contact list of any of the authors. The link was first circulated at 12:54 IST on

20th May, 2021 and kept open for responses till 23:00 IST on 31st May, 2021. It would be worthwhile to note that the survey was conducted during the peak of second wave of COVID-19 pandemic in India and in-person interview was quite impossible at that time because of the ongoing lockdown in the state of West Bengal. A reminder was sent on every 3rd day. The survey invitation stated that the participants can choose not to participate, and participation in the survey will imply providing informed consent. The mobile numbers of the respondents were collected to check for duplicate responses. The survey questionnaire would take around 10 minutes to complete. A total of 250 responses were received. The authors made individual call to mobile number of the respondents to make sure that they fulfilled the inclusion criteria and verified their responses. Institutional Ethical Committee (IEC) clearance was obtained on a fast-track basis from College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal.

Inclusion Criteria

- Those who have suffered and recovered from COVID-19 illness (i.e., at least 3 weeks have elapsed since the onset of the first sign and symptom of the illness).
- Both genders.
- Subjects who are able to read and understand English.
- Had an internet connection and WhatsApp installed on their phone.
- Age between 18 and 60 years.

Exclusion Criteria

- Unwilling and not providing informed consent for the study.

Instrument Used

- *Self-designed questionnaire*: This online survey was conducted by a 71-item self-designed questionnaire. The questionnaire included questions regarding: (a) sociodemographic profile of the respondents (5 items), (b) clinical data of the respondents (7 items), (c) vaccine-related data (11 items), (d) COVID-19 illness-related data (11 items), and (e) neuropsychiatric manifestations of COVID-19 (37 items). The questionnaire was reviewed by two consultant psychiatrists, one clinical psychologist, and modifications were done as per their suggestions. The questionnaire was pre-tested on 15 subjects who recovered from COVID-19 illness.

Statistical Analysis

Descriptive analysis was presented in terms of mean and standard deviation with range for continuous variables and frequency with percentage for ordinal and nominal variables. All analysis was done with the help of SPSS (Version 21, IBM Corp., Armonk, NY, USA).

RESULTS

A typical subject was male (63.2%), healthcare provider (33.6%), Hindu (96.4%) by religion, and from urban background (74%) (Table 1).

Nearly about two-fifth (43.2%) and one-fifth (20.8%) of the subjects had comorbid physical and psychiatric disorders, respectively. Hypertension (18.8%), dyslipidemia (13.6%), obesity (13.2%), and diabetes (10%) were the most commonly reported physical comorbidities. Somatoform disorders (12.4%) and depressive disorders (3.2%) were the most commonly reported psychiatric comorbidities (Table 2).

Table 1: Sociodemographic profile of the respondents (N = 250)

Variables	N (%) / Mean ± SD
Age	39.34 (10.14)
Gender	
Male	158 (63.2)
Female	92 (36.8)
Profession	
Healthcare provider	84 (33.6)
Teacher/Professor	24 (9.6)
Banking service personnel	4 (1.6)
Pharma industry employee	51 (20.4)
Journalist	1 (0.4)
Other government or semigovernment employee	13 (5.2)
Private company employee	30 (12)
Housewife/Homemaker	13 (5.2)
Students	13 (5.2)
Others	17 (6.8)
Religion	
Hindu	241 (96.4)
Muslim	3 (1.2)
Sikh	5 (2)
Others	1 (0.4)
Residence	
Rural	16 (6.4)
Urban	185 (74)
Semiurban	49 (19.6)

At the time of conducting the survey, only one-third (32.8%) of the subjects received two doses of vaccination against COVID-19. Nearly one-fifth (23.2%) of the subjects reported side effects after receiving the vaccine. Injection- site pain and swelling (17.6%), body aches and pains (5.2%), and fever (4.8%) were the most commonly reported side effects. Nearly about one-tenth (12.4%) of the subjects contracted COVID-19 virus infection even after receiving two doses of COVID vaccine (Table 3).

Majority (41.2%) of the subjects had COVID-19 illness in the past 1 month. Nearly about one-sixth (17.6%) of the subjects lost somebody in their family due to COVID-19. Majority (55.2%) of the subjects lost at least one friend or colleague because of COVID-19 in past 1 year (Table 4).

Majority (59.2%) of the subjects experienced persistent fatigue after recovering from COVID-19. Nearly about one-third of the subjects experienced persistent low mood (34.8%), sleep difficulty (38.8%), anxiety symptoms (39.6%), irritability (34.4%), difficulty in concentrating (39.6%), and forgetfulness (30.8%). Nearly about one-sixth of the subjects had panic attacks (18.4%), flashback of illness (16%), obsessive-compulsive symptoms (18.8%), and sexual difficulty (16%) after recovering from COVID-19. Nearly half of the subjects became more preoccupied about bodily symptoms (45.6%), became more anxious on reading COVID-19-related news (45.2%), and hence avoided the same (49.6%). Nearly about one-fifth of the subjects had persistent loss of smell (25.6%), taste (20.4%), and brain fog (26.4%). A miniscule proportion of the subjects had new-onset headache (15.2%), giddiness (12%), and tremor of hands (9.6%) (Table 5).

Table 2: Clinical data of the respondents (N = 250)

Variables	N (%)
Presence of medical comorbidity	
Yes	108 (43.2)
No	142 (56.8)
Type of medical comorbidity	
Obesity	33 (13.2)
Hypertension	47 (18.8)
Diabetes	25 (10)
Epilepsy	03 (1.2)
Chronic kidney disease	01 (0.4)
Hypo- or Hyperthyroidism	16 (6.4)
Dyslipidemia	34 (13.6)
Chronic obstructive pulmonary disease	11 (4.4)
Tuberculosis	02 (0.8)
Benign prostatic hyperplasia	05 (2.0)
Ischemic heart disease	17 (6.8)
Stroke	07 (2.8)
Malignancy	00 (00)
Others	11 (4.4)
Not applicable	142 (56.8)
Were you started on any new medication for any of the below-mentioned physical condition after recovering from COVID-19 illness?	
Hypertension	11 (4.4)
Diabetes	12 (4.8)
Thyroid disorders	00 (00)
Dyslipidemia	08 (3.2)
Brady or Tachycardia	19 (7.6)
Other cardiac conditions	03 (1.2)
Chest problems	17 (6.8)
Others	01 (0.4)
Not applicable	190 (76)
Presence of psychiatric disorder (current or past)	
Yes	52 (20.8)
No	198 (79.2)
Type of psychiatric disorders	
Schizophrenia or psychotic illness	01 (0.4)
Depressive disorder	08 (3.2)
Bipolar mood disorder	02 (0.8)
Anxiety disorders	04 (1.6)
Somatoform disorders	31 (12.4)
Obsessive-compulsive disorders	03 (1.2)
Sexual disorders	00 (00)
Sleep disorders	03 (1.2)
Dementia	00 (00)
Substance use disorders	02 (0.8)
Others	02 (0.8)
Not applicable	198 (79.2)
Have you been started on any new psychiatric medication(s) after recovering from COVID-19 illness?	
Yes	22 (8.8)
No	228 (91.2)
Have you been started on any new sleep medication after recovery from COVID-19 illness?	
Yes	23 (9.2)
No	227 (90.8)

Table 3: Vaccine-related data (N = 250)

Variables	N (%)
Have you received two doses of COVID vaccine (Covaxin or Covishield)?	
Yes	82 (32.8)
No	168 (67.2)
How many days ago did you receive the second dose of the vaccine?	
Less than 1 week	1 (4)
Between 1 week to 1 month	22 (8.8)
Between 1 month to 3 months	57 (22.8)
Not applicable	170 (68)
Which vaccine did you receive?	
Covaxin	10 (4)
Covishield	99 (39.6)
Not applicable	141 (56.4)
Did you experience any side effects after receiving the vaccine?	
Yes	58 (23.2)
No	51 (20.4)
Not applicable	141 (56.4)
What side effects did you experience after receiving the vaccine?	
Injection site pain and swelling	44 (17.6)
Injection site itching	03 (1.2)
Fever	12 (4.8)
Body aches and pains	13 (5.2)
Sore throat	01 (0.4)
Headache	05 (2.0)
Shivering of the whole body	00 (00)
Reeling of head	04 (1.6)
Gastrointestinal upset/Loose stool	01 (0.4)
Others	05 (2.0)
Not applicable	192 (76.8)
Were you apprehensive about taking the vaccine?	
Yes	33 (13.2)
No	110 (44.0)
Not applicable	107 (42.8)
Did all of your family members (those who stay with you except for children) get the vaccine?	
Yes	121 (48.4)
No	129 (51.6)
Did you develop COVID-19 (confirmed by RT-PCR or rapid antigen test) after getting two doses of vaccine?	
Yes	31 (12.4)
No	219 (87.6)
If yes, after how many days of taking the second dose of vaccine did you develop the COVID-19 illness?	
Less than 1 week	3 (1.2)
Between 1 week and 1 month	4 (1.6)
More than 1 month	24 (9.6)
Not applicable	219 (87.6)
Did you develop COVID-19 illness after 1st dose of vaccine?	
Yes	22 (8.8)
No	228 (91.2)
After how many days of the 1st dose of vaccination did you develop COVID-19 illness?	
Within 4 weeks	8 (3.2)
After 4 weeks	14 (5.6)
Not applicable	228 (91.2)

Table 4: COVID-19 illness-related data (N = 250)

Variables	N (%)
When did you get the COVID-19 illness?	
Within last 1 month	103 (41.2)
Between 1 month and 3 months	42 (16.8)
Between 3 months and 6 months	21 (8.4)
More than 6 months ago	84 (33.6)
How was the COVID-19 illness diagnosed in your case?	
RT-PCR test	204 (81.6)
Rapid antigen test	46 (18.4)
How were you managed for the abovesaid COVID-19 illness?	
Managed at home without oxygen support	203 (81.2)
Managed at home with oxygen support	9 (3.6)
Managed in the hospital without oxygen support	19 (7.6)
Managed in the hospital with oxygen support	18 (7.2)
Managed in the hospital with ventilator support	1 (0.4)
If you received oxygen support, through which mode was it given?	
Nasal prongs/Cannula	18 (7.2)
Simple face mask	7 (2.8)
Non-rebreathing mask (NRBM)	1 (0.4)
High-frequency nasal oxygen (HFNO)	1 (0.4)
Invasive ventilation	1 (0.4)
Not applicable	222 (88.8)
If hospitalized, what was the duration of hospital stay?	
Less than 1 week	17 (6.8)
Between 1 week and 2 weeks	18 (7.2)
Between 2 weeks and 4 weeks	3 (1.2)
Not applicable	212 (84.8)
After discharge, did you require oxygen support at home?	
Yes	2 (0.8)
No	36 (14.4)
Not applicable	212 (84.8)
If you received oxygen support at home following discharge, it was for what duration?	
Less than 2 weeks	1 (0.4)
More than 2 weeks	1 (0.4)
Not applicable	248 (99.2)
Did other family members (those staying with you) also suffer from COVID-19 illness in past 1 year?	
Yes	143 (57.2)
No	107 (42.8)
Was there any COVID-19-related death in your family?	
Yes	44 (17.6)
No	206 (82.4)
If there has been a COVID-19-related death in your family, how was he/she related to you?	
1st degree relative	21 (8.4)
2nd degree relative	16 (6.4)
Distant relative	7 (2.8)
Not applicable	206 (82.4)
Did you lose any friends or colleagues because of COVID-19 in the past 1 year?	
Yes	138 (55.2)
No	112 (44.8)

Table 5: Neuropsychiatric manifestations of COVID-19 (N = 250)

Variables	N (%)
Did you experience persistent low mood for at least 2 weeks after recovering from COVID-19?	
Yes	87 (34.8)
No	163 (65.2)
Did you experience persistent and excessive fatigue for at least 2 weeks after recovering from COVID-19?	
Yes	148 (59.2)
No	102 (40.8)
Did you feel difficulty in experiencing pleasure for at least 2 weeks after recovering from COVID-19?	
Yes	96 (38.4)
No	154 (61.6)
Did you experience any elevated mood or euphoria for at least 1 week after recovering from COVID-19 illness?	
Yes	26 (10.4)
No	224 (89.6)
Did you feel like having increased energy or constant urge to do many things after you recovered from COVID-19 illness?	
Yes	42 (16.8)
No	208 (83.2)
Did you experience sleep difficulty after recovering from COVID-19?	
Yes	96 (38.4)
No	154 (61.6)
What was the average amount of sleep at night that you got after recovering from COVID-19?	
Less than 2 hours	5 (2.0)
Between 2 and 4 hours	24 (9.6)
Between 4 and 6 hours	68 (27.2)
Between 6 and 8 hours	118 (47.2)
More than 8 hours	35 (14.0)
Was this amount of sleep at night your usual before you got COVID-19 illness?	
Yes	149 (59.6)
No	101 (40.4)
Did you have suicidal thoughts after recovering from COVID-19 illness?	
Yes	10 (4.0)
No	240 (96.0)
Did you feel more anxious than ever after recovering from COVID-19 illness?	
Yes	99 (39.6)
No	151 (60.4)
Did you feel that your existence has been threatened by COVID-19 illness?	
Yes	87 (34.8)
No	163 (65.2)
Did you find it difficult to concentrate on things after recovering from COVID-19 illness?	
Yes	99 (39.6)
No	151 (60.4)
Did you become forgetful more than ever after recovering from COVID-19 illness?	
Yes	77 (30.8)
No	173 (69.2)

(Contd...)

Table 5: (Contd...)

Variables	N (%)
Did you experience a pounding of heart (palpitations) after recovering from COVID-19 illness?	
Yes	83 (33.2)
No	167 (66.8)
Did you feel restless after recovering from COVID-19 illness?	
Yes	80 (32.0)
No	170 (68.0)
Did you feel irritable after recovering from COVID-19 illness?	
Yes	86 (34.4)
No	164 (65.6)
Did you have panic attacks after recovering from COVID-19 illness?	
Yes	46 (18.4)
No	204 (81.6)
Did you have flashbacks of illness even after recovering from COVID-19 during awakened state or in dreams during sleep?	
Yes	40 (16.0)
No	210 (84.0)
Did you become concerned about your bodily symptoms (e.g., body aches and pains, sense of lump in throat, sense of choking, jerky breathing, etc.) after recovering from COVID-19 illness?	
Yes	114 (45.6)
No	136 (54.4)
Did you always feel that you might have got some other physical illness as well after recovering from COVID-19 illness, which led to frequent doctor consultation or investigations?	
Yes	65 (26.0)
No	185 (74.0)
Did you experience persistent sexual difficulty after recovering from COVID-19 illness?	
Yes	40 (16.0)
No	210 (84.0)
If yes, what was the kind of sexual problem that you had?	
Decreased sexual interest	21 (8.4)
Premature ejaculation	6 (2.4)
Erection difficulty	5 (2.0)
Painful sexual intercourse	3 (1.2)
Delayed ejaculation	2 (0.8)
Absence of orgasm	3 (1.2)
Not applicable	210 (84.0)
Did you suffer from constant fear of dying after recovering from COVID-19 illness?	
Yes	36 (14.4)
No	214 (85.6)
Did you fear that your near and dear ones might die because of COVID after recovering from COVID-19 illness?	
Yes	103 (41.2)
No	147 (58.8)
Did you consciously avoid COVID-19-related news in social media, print media, or televised media after recovering from COVID-19 illness?	
Yes	124 (49.6)
No	126 (50.4)

(Contd...)

Table 5: (Contd...)

Variables	N (%)
Did reading COVID-19-related news make you more anxious after you recovered from COVID-19 illness?	
Yes	113 (45.2)
No	137 (54.8)
Did you think that your preoccupation with cleanliness (repeated washing of hands or taking bath) grow after you recovered from COVID-19 illness?	
Yes	88 (35.2)
No	162 (64.8)
Did you think that your preoccupation with cleanliness bothered others after you recovered from COVID-19 illness?	
Yes	43 (17.2)
No	207 (82.8)
Did you have repeated washing rituals, repeated checking behavior, unpleasant religious and sexual thoughts/recurrent intrusive thoughts/impulses/images, etc., after recovering from COVID-19 illness?	
Yes	47 (18.8)
No	203 (81.2)
Did you think that your brain has been working slowly after you recovered from COVID-19 illness?	
Yes	66 (26.4)
No	184 (73.6)
Did you think that you had difficulty in writing, buttoning shirts, or holding things after you recovered from COVID-19 illness?	
Yes	20 (8.0)
No	230 (92.0)
Did you have new-onset tremor of hands after recovering from COVID-19 illness?	
Yes	24 (9.6)
No	226 (90.4)
Did you have any new-onset fits (seizure or epilepsy) after recovering from COVID-19 illness?	
Yes	6 (2.4)
No	244 (97.6)
Did you have any new-onset headache after recovering from COVID-19 illness?	
Yes	38 (15.2)
No	212 (84.8)
Did you have new-onset giddiness (reeling of the head) after recovering from COVID-19 illness?	
Yes	30 (12.0)
No	220 (88.0)
Did you have persistent loss of smell even after recovering (i.e., after 3 weeks of onset of signs and symptoms) from COVID-19?	
Yes	64 (25.6)
No	186 (74.4)
Did you have persistent loss of taste even after recovering (i.e., after 3 weeks of onset of signs and symptoms) from COVID-19?	
Yes	51 (20.4)
No	199 (79.6)

DISCUSSION

Index survey is unique in the sense that it attempted to explore the prevalence of neuropsychiatric manifestations of COVID-19 when the second wave of the pandemic was at its peak. This study is the first of its kind from Eastern part of India to look into neuropsychiatric manifestations of COVID-19.

The sociodemographic profile suggests that majority of the respondents were male, healthcare providers, and coming from urban background. Considering that the principal investigator and co-investigators all are doctors, it was expected that healthcare providers would be overrepresented in the sample.

Coronavirus disease-2019 is said to infect more people having physical comorbidities. Nearly about two-fifth of the subjects had comorbid physical disorders, namely, hypertension, dyslipidemia, obesity, and diabetes in decreasing order of frequency. These physical conditions are also routinely seen in our clinical practice. One-fifth of the subjects had comorbid psychiatric disorders, somatoform, and depressive disorder being the most common. These two disorders are also known as common mental disorders having high prevalence among outpatient attendees in rural and urban healthcare centers in India.

At the time of conducting the survey, one-third of the subjects received two doses of vaccination against COVID-19. Majority received Covishield vaccine because of the policy of the government. Nearly one-fifth of the subjects reported side effects, e.g., injection-site pain and swelling, body aches and pains, and fever after receiving the vaccine. These side effects are well-documented after COVID-19 vaccination.²⁶

Majority of the subjects had at least one of their family members affected with COVID-19 in the last 1 year. Also, majority of the subjects lost at least one friend or colleague because of COVID-19 in the past 1 year, and nearly about one-sixth of the subjects lost somebody in their family due to COVID-19. This can be considered to have caused significant psychosocial stress in those individuals, which might make them more vulnerable to develop psychiatric disorders.

Majority of the subjects experienced persistent fatigue after recovering from COVID-19. Nearly about one-third of the subjects experienced persistent low mood, sleep difficulty, anxiety symptoms, irritability, difficulty in concentrating, and forgetfulness. Nearly about one-sixth of the subjects had panic attacks, flashback of illness, obsessive-compulsive symptoms, and sexual difficulty after recovering from COVID-19. Nearly half of the subjects became more preoccupied about bodily symptoms, became more anxious on reading COVID-19-related news, and hence avoided the same. Studies exploring neuropsychiatric manifestations of COVID-19 following recovery reported depressed mood (3.8–41.2%), anxiety (4.6–51.3%), traumatic memories (30.4–33.6%), irritability (12.8%), memory impairment (18.9%), fatigue (19.3%), insomnia (12.1%), and sleep disorder (100%).^{21–24} As one can see, there is much variability in the prevalence of neuropsychiatric symptoms following COVID-19 because the pandemic was still evolving, and the full picture was yet to evolve. Nearly about one-fifth of the subjects had persistent loss of smell, taste, and brain fog. A miniscule proportion of the subjects had new-onset headache, giddiness, and tremor of hands. In a study by Nalleballe et al., headache was the most common neurologic symptom

followed by sleep disturbances, encephalopathy, myalgia (2.0%), loss of taste and smell, stroke and transient ischemic attack, and seizures.²¹ Occurrence of these neuropsychiatric manifestations is expected to give insight into the pathogenesis of COVID-19 disease in the immediate future.

The survey had certain limitations. Being a cross-sectional online survey, cause–effect relationship could not be established. The Google form was sent through WhatsApp, which the recipients might have forwarded to other groups as well. Therefore, the population from which the sample is drawn is not clearly defined. Duplicate responses were another worry. However, the authors tried to eliminate it by collecting the phone numbers along with the survey questionnaire. In case respondents replied from two separate mobile phones, it was verified through individual telephonic calls. Because the authors did not have access to the state or district-wise data of COVID-19-recovered persons, online survey was deemed the only way possible to conduct such study during a time when lockdown was imposed in the state of West Bengal at the height of second wave of COVID-19 pandemic. Recall bias was another major limitation of this survey. The survey did not use any pre-existing tool to measure COVID-19-related mental health problems because all the available scales assessed any one of the following symptom domains, namely – anxiety, fear, phobia, stress, peritraumatic distress, and obsessive – compulsive symptoms associated with COVID-19 illness leaving out other symptoms. All the above factors limited the generalizability of the findings of the index study. This is also the reason for not conducting any inferential statistics and restricting ourselves to descriptive statistics alone. Subjects who were identified to have psychiatric symptoms or disorders were provided supportive psychotherapy over telephone and advised to consult a psychiatrist as soon as possible.

CONCLUSION

Coronavirus disease-2019 pandemic poses an extraordinary medical challenge to mankind. The measures to contain the spread of the disease have been hitherto unseen to many of us. The socioeconomic effect of this pandemic is expected to last very long. This survey was an attempt to look into the prevalence of neuropsychiatric manifestations of COVID-19 while the pandemic was still at its peak. Index survey suggested that persistent low mood, sleep difficulty, anxiety symptoms, irritability, difficulty in concentrating, forgetfulness, loss of smell and taste, and brain fog were common neuropsychiatric symptoms after recovering from COVID-19.

FUTURE DIRECTION

Future studies should look into the neuropsychiatric manifestations of COVID-19 in a larger population, which should be representative of the whole of India. District or state COVID-19 database can be used for this purpose. As COVID-19 pandemic will recede, clinicians will be challenged with a myriad of post COVID-19 medical sequelae. Psychiatrists and neurologists should be aware of such manifestations and prepare themselves to tackle these problems.

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