

Neuropsychiatric Issues in Persons with COVID-19 Infection: An Online Survey from India

Mrugesh Vaishnav¹, Sandeep Grover², Gautam Saha³, Parth Vaishnav⁴, Gundugurti Prasad Rao⁵, Ajit Avasthi⁶

ABSTRACT

Background: Multiple surveys across the globe during the first wave of the pandemic suggested an increase in the prevalence of various psychiatric disorders like depression, anxiety disorder, and insomnia in the general population, patients with acute coronavirus disease-2019 (COVID-19) infection, and in the post-COVID-19 infection patients. However, the data on psychological morbidity during the post-COVID-19 infection phase is limited barring a few small sample size studies. In this background, this study aimed to evaluate the prevalence of neuropsychiatric issues in persons who had suffered from COVID-19 infection and compare the same with persons who did not suffer from COVID-19 infection, but witnessed the same in one of their relatives.

Materials and methods: In this cross-sectional web-based study, 1172 adult participants, aged 18–75 years, who had either suffered and recovered from COVID-19 infection or those who did not develop COVID-19 infection but witnessed the infection in a family member completed the PHQ-9, GAD-7 scale, fear of COVID-19 Scale (FCV-19S), brief resilient coping scale (BRCS), brief resilience scale (BRS), and a 19-item self-designed questionnaire to evaluate neuropsychiatric issues and coping mechanisms.

Results: In terms of psychiatric morbidity, about one-fourth of those who developed COVID-19 had depression and that of higher severity significantly more than those who did not develop COVID-19 themselves. Similarly, about one-fourth of the persons who developed COVID-19 infection also had anxiety disorder and higher proportion of them had more severe anxiety, which was significantly higher than those who did not develop COVID-19 themselves. Compared to those who did not develop COVID-19 infection themselves, a higher proportion of those who developed COVID-19 demonstrated intense recollection or flashbacks of illness, trying to avoid memories, thoughts, or feelings related to the stressful experience, brain operating slowly, forgetfulness, persistent headache, new-onset seizures, and higher level of resilient coping.

Conclusion: There is an urgent need to focus on the mental health consequences of COVID-19 infection and to provide multidisciplinary care to people who have gone through the COVID-19 infection to prevent and manage the post-COVID or long-COVID symptoms.

Keywords: Anxiety, COVID-19, Depression, Fear, Neuropsychiatric issues, Resilience.

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INTRODUCTION

The once-in-a-century coronavirus pandemic which has wreaked global havoc is an ongoing global pandemic of coronavirus disease-2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ The World Health Organization declared the outbreak as a Public Health Emergency of International Concern (PHEIC) on January 30, 2020, which quickly escalated into a pandemic on March 11, 2020 and brought the world to its knees.^{2,3}

Different surveys carried out across the globe during the first wave of the pandemic suggested an increase in the prevalence of various psychiatric disorders like depression, anxiety disorder, and insomnia in the general population, patients with acute COVID-19 infection and in the post-COVID-19 infection patients. A meta-analysis of five studies that included data of 9074 persons reported the prevalence of stress to be 29.6% (CI: 24.3–35.4%). The same meta-analysis reported prevalence of anxiety in 17 studies involving 63,439 persons to be 31.9% (95% CI: 27.5–36.7%) and that of depression in 14 studies involving 44,531 participants at 33.7% (95% CI: 27.5–40.6%).⁴ A recent meta-analysis that pooled data from 65 studies involving 97,333 health care workers from 21 countries reported the pooled prevalence of depression to be 21.7% (95% CI: 18.3–25.2%). The same meta-analysis reported pooled prevalence of anxiety to be 22.1% (95% CI: 18.2–26.3%), and that of post-traumatic stress disorder (PTSD) to be 21.5% (95% CI: 10.5–34.9%). In terms of countries, the prevalence rated for

¹Samvedana Group of Hospital and Research Centre, Institute of Psychological and Sexual Research-Samvedana Foundation, Ahmedabad, Gujarat, India

²Department of Psychiatry, Postgraduate Institute of Medical Education and Research, Chandigarh, India

³Department of Psychiatry, Clinic Brain Neuropsychiatric Institute and Research Center, Barasat, West Bengal, India

⁴Department of Psychiatry, Institute of Psychological and Sexual Research, Ahmedabad, Gujarat, India

⁵Department of Psychiatry, ASHA Hospital, Hyderabad, Telangana, India

⁶Department of Psychiatry, Fortis Hospital, Mohali, Punjab, India

Corresponding Author: Mrugesh Vaishnav, Samvedana Group of Hospital and Research Centre, Institute of Psychological and Sexual Research-Samvedana Foundation, Ahmedabad, Gujarat, India, Phone: +91 9825767565, e-mail: mrugeshvaishnav@gmail.com

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depression and anxiety were reported to be highest in studies from countries in the Middle East (34.6%; 28.9%).⁵ Another meta-analysis

which focused on psychiatric morbidity associated with the severe coronavirus infections and included data from 65 published studies and 7 preprints reported that during acute illness the prevalence of depressed mood was 32.6% (95% CI: 24.7–40.9%) and that of anxiety was 35.7% (95% CI: 27.6–44.2%). The prevalence of impaired memory was 34.1 (95% CI: 26.2–42.5%) and that of insomnia was 41.9% (95% CI: 22.5–50.5%).⁶

Emerging data from all parts of the world also suggest that there is an increase in the prevalence of psychiatric and neuropsychiatric manifestations in the form of depression, anxiety, insomnia, post-traumatic stress disorders (PTSD), and fatigue in persons who have suffered from COVID-19 infection. A meta-analysis suggested that in the post-illness state the prevalence of depressed mood was 10.5% (95% CI: 7.5–14.1%), anxiety was 12.3% (95% CI: 7.7–17.7%), irritability was 12.8% (8.7–17.6%), memory impairment was 18.9% (95% CI: 14.1–24.2%), fatigue was 19.3% (95% CI: 15.1–23.9%), traumatic memories was 30.4% (95% CI: 23.9–37.3%) and that of sleep disorder was 100% (95% CI: 88–100%). Another meta-analysis of data suggested that the point prevalence of PTSD during the post-illness stage was 32.2% (95% CI: 23.7–42%), and that of depression and anxiety are 14.8% (95% CI: 12.1–18.2%) and 14.7% (95% CI: 11.1–19.4%).⁶ Another meta-analysis reported the pooled prevalence to be 45% (95% CI: 37–54%) for depression, 47% (95% CI: 37–57%) for anxiety, and 34% (95% CI: 19–50%) for sleep disturbances in patients with COVID-19 infection.⁷

Studies from India also suggest a high prevalence of depression and anxiety in the general population and patients with COVID-19 infection and also during the post-COVID-19 infection phase.^{8–10} However, the data on psychological morbidity during the post-COVID-19 infection phase is limited to occasional small sample size studies. In this background, this study aimed to evaluate the prevalence of neuropsychiatric issues in India amongst persons who have suffered from COVID-19 infection and compare the same with persons who themselves did not suffer from COVID-19 infection, but witnessed the same in one of their relatives.

MATERIALS AND METHODS

This study was a cross-sectional web-based study in which the first phase of data collection was from June 24, 2021, during the downslide of the second wave of COVID-19, until July 24, 2021. The online trilingual (English, Hindi and Gujarati) survey questionnaire using Google Forms was circulated via WhatsApp, email, text message, Facebook, Instagram, etc., using the snowball sampling technique. The recipients of the survey link were also requested to forward the survey link to their known contacts. The link was designed in such a way that only one response can be generated by entering one phone number even with multiple devices. The study was approved by an independent ethics committee IBIOME IEC/40/INDT/ GJ2013/ RR1, IORG no. IORG0005548. The survey link mentioned that only those persons who have either suffered from COVID-19 infection themselves, or one of their close relatives had developed COVID-19 infection and they have been in close contact with them, should complete the survey. Additionally, the survey link also mentioned that only persons who are aged 18–75 years should complete the survey. The survey invitation clearly stated that the participants will have the right not to participate in the survey and participation in the survey will imply providing informed consent. The participants were completely assured of the confidentiality of the data. The survey also included those with preexisting mental illnesses, but this subgroup of the participants was not included in the present analysis.

The survey questionnaires included:

Sociodemographic details: The first section of the survey included sociodemographic variables with respect to age, gender, educational qualification, marital status, profession, residence area, and religion.

Medical Illness-related data: The second section collected information related to medical comorbidities. To evaluate the COVID-19 illness-related information, COVID-19 vaccine-related details, confusion or fear associated with vaccination pattern, side effect of vaccination, diagnosis of COVID-19 by rapid antigen test, RT-PCR, CT thorax, one or multiple tests, home-based or hospital-based treatment, stay in number of days in hospital with or without oxygen or in ICU were collected.

Patient health questionnaire-9 (PHQ-9): PHQ-9 is a self-administered version of the PRIME-MD diagnostic instrument for screening of depression. The PHQ-9 has nine items, each of which evaluates the nine diagnostic criteria of depression as per the DSM-IV criteria on a four-point scale of “0” (not at all) to “3” (nearly every day). This questionnaire had been found to have excellent reliability and validity, sensitivity, and specificity for major depression. A cut-off score of more than or equal to 10 is considered to be an indicator of depression.¹¹

Generalized anxiety disorder-7 (GAD-7) scale: This is a seven-item anxiety scale with good reliability as well as criterion, construct, factorial, and procedural validity. Cut off points of 5, 10, and 15 might be interpreted as representing mild, moderate, and severe levels of anxiety on the GAD-7. Increasing scores on the scale are strongly associated with multiple domains of functional impairment. There is good agreement between self-report and interviewer-administered versions of the scale.¹²

Fear of COVID-19 scale (FCV-19S): FCV-19S has seven items and the response to each item is measured on a five-point Likert scale (strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree). Scores are categorized as low and high levels of fear based on the mean, which was taken as the cut-off. The scores less than or equal to the mean were considered as low fear, and scores above the mean were considered as indicator of high fear. This scale has been validated and tested for reliability in a few recent studies.¹³

Self-designed questionnaire: A self-designed questionnaire was also included to evaluate the effect of COVID-19 on psychiatric manifestation like PTSD, panic attack, obsessive compulsive features, somatization, worry, psychotic symptoms, and loneliness. Neurological manifestations like brain operating slowly, forgetfulness, difficulty in holding things, tremors, seizures, headache, and dizziness were assessed.

Brief resilient coping scale (BRCS): It is a four-item measure designed to capture tendencies to cope with stress in a highly adaptive manner. Its validity and reliability had also been tested in earlier studies. Each item is rated on a five-point Likert scale (does not describe me at all, does not describe me, neutral, describes me, describes me very well), and the scores are categorized as low (score 4–13), medium (score 14–16), and high (score 17–20) resilient copers.¹⁴

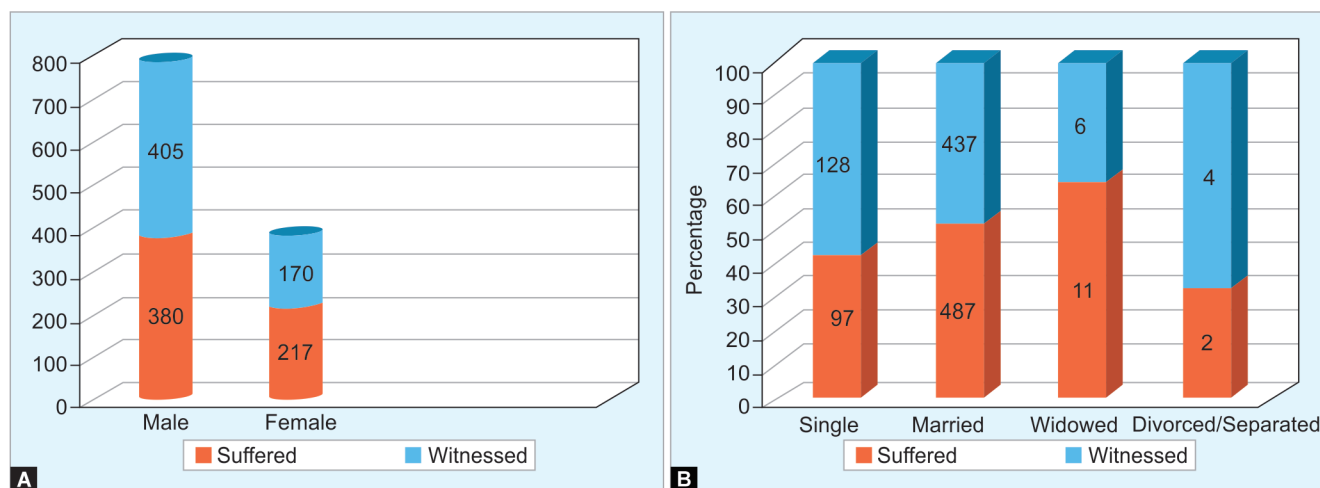
Brief resilience scale (BRS): The Brief resilience scale is a six-item scale, with each item rated on a five-point Likert scale (strongly disagree, disagree, neutral, agree, and strongly agree). Some of the items were reverse-coded (items 2, 4, and 6). The scale has acceptable internal consistency in both samples, with Cronbach's α values equal to 0.76 and 0.72, respectively.^{15,16}

Statistical Analysis

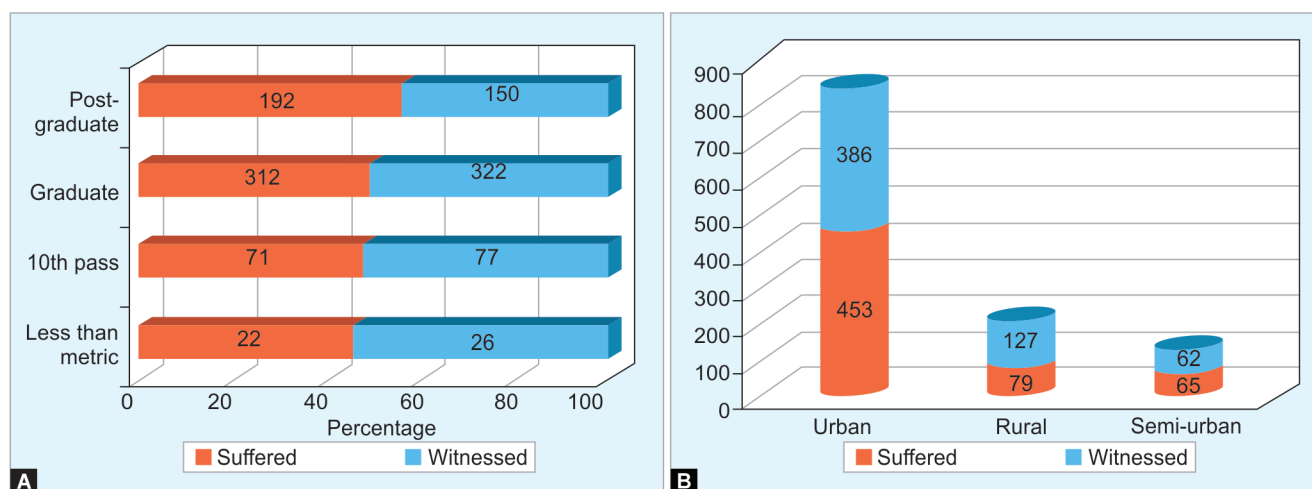
Data analysis was done using IBM SPSS version 25 (IBM, New York, NY, USA). All collected data were entered in Microsoft Excel data sheets and variables were entered into a common database for analysis. Quantitative variables are expressed as mean \pm standard deviation, and qualitative variables are expressed as percentage. Comparison of parametric values between groups was performed using the independent sample t test and multivariate analysis. Categorical variables were compared using the Chi-squared test. A nominal significance was taken as a two-tailed $p < 0.05$.

RESULTS

The survey included 1172 subjects with 597 participants having suffered from COVID-19 infection (cases) and 575 participants although themselves did not suffer from COVID-19 infection but witnessed the same in one of their relatives (controls). The mean age of the participants (1172 responses) was 40.99 ± 13.30 years, and there was no significant difference in the mean age of participants of both the groups. About two-third of the participants (66.97%) were male, and slightly more than three-fourth of them were married (78.84%) (Fig. 1) and educated up to at least graduation (83.3%). A large proportion of the participants were employed, from an urban locality (71.6%) (Fig. 2), and Hindu by religion (93.3%). Compared to those, who did not develop COVID-19 infection but witnessed the infection in a family member, those who developed COVID-19 infection were more often female, married, and from an urban locality. Baseline demographic and clinical data of the study groups are presented in Table 1.



Figs 1A and B: The survey included 1,172 subjects with 597 participants having suffered from COVID-19 infection (cases) and 575 participants who although themselves had not suffered from COVID-19 infection but witnessed the same in one of their relative (controls). The mean age of the participants (1,172 responses) was 40.99 ± 13.30 years and there was no significant difference in the mean age of participants of both the groups. About two-third of the participants (66.97%) were male, and slightly more than three-fourth of them were married (78.84%)



Figs 2A and B: Out of 1,172 in the survey sample, 83.3% were educated at least up to the undergraduate level and were employed from urban localities

Table 1: Sociodemographic profile of the study participants

| <i>Variables</i> | <i>Whole sample frequency (%) / mean (SD) N = 1172</i> | <i>Persons who developed COVID-19 infection frequency (%) / mean (SD) (N = 597)</i> | <i>Persons who witnessed COVID-19 infection frequency (%) / mean (SD) (N = 575)</i> | <i>Chi-squared test/ t-test value</i> |
|----------------------------------|--|---|---|---|
| Age | 40.99 (13.3) | | | |
| Sex | | | | |
| Male | 785 (66.97) | 380 (63.65) | 405 (70.43) | 6.09 (0.013 [*]) |
| Female | 387 (33.02) | 217 (36.34) | 170 (29.57) | |
| Marital status | | | | |
| Married | 924 (78.84) | 487 (81.57) | 437 (76) | 8.7 (0.03 [*]) |
| Unmarried | 225 (19.19) | 97 (16.25) | 128 (22.26) | |
| Widowed | 17 (1.45) | 11 (1.84) | 6 (1.044) | |
| Divorced/separated | 6 (0.51) | 2 (0.33) | 4 (0.696) | |
| Educational qualification | | | | |
| Less than matriculation | 48 (4.1) | 22 (3.7) | 26 (4.5) | 5.6 (0.133) |
| 10th pass | 148 (12.63) | 71 (11.9) | 77 (13.4) | |
| Graduate | 633 (54.01) | 312 (52.3) | 322 (56) | |
| Postgraduate | 343 (29.3) | 192 (32.2) | 150 (26.1) | |
| Occupation | | | | |
| Self-employed | 191 (16.3) | 116 (19.4) | 77 (13.4) | 47.034 (0.509) |
| Employed | 147 (12.5) | 80 (13.4) | 66 (11.5) | |
| Home-maker | 223 (19.0) | 122 (20.4) | 101 (17.6) | |
| Unemployed | 20 (1.7) | 10 (1.7) | 10 (1.7) | |
| Retired | 80 (6.8) | 49 (8.2) | 31 (5.4) | |
| Student | 62 (5.3) | 28 (4.7) | 34 (5.9) | |
| Pharmaceutical industry | 230 (19.6) | 72 (12.1) | 158 (27.5) | |
| Healthcare workers | 151 (12.9) | 82 (13.7) | 69 (12) | |
| Teacher | 40 (3.4) | 23 (3.853) | 17 (0.521) | |
| Banking personnel | 14 (1.2) | 10 (1.675) | 3 (0.522) | |
| Grocer and taxi driver | 10 (0.8) | 2 (0.335) | 8 (1.391) | |
| Journalist | 2 (0.17) | 1 (1.675) | 1 (0.174) | |
| Police personnel | 2 (0.17) | 2 (0.335) | 0 | |
| Locality | | | | |
| Urban | 839 (71.6) | 453 (78.78) | 386 (64.66) | 16.19 (<0.001 ^{***}) |
| Semi-urban | 127 (10.84) | 65 (11.30) | 62 (10.385) | |
| Rural | 206 (17.58) | 79 (13.74) | 127 (21.27) | |
| Religion | | | | |
| Hindu | 1093 (93.3) | 550 (92.13) | 524 (91.13) | 0.73 (0.86) |
| Muslim | 56 (4.8) | 36 (6.03) | 39 (6.78) | |
| Christian | 16 (1.4) | 7 (1.17) | 9 (1.57) | |
| Sikh | 7 (0.6) | 4 (0.67) | 3 (0.52) | |

Out of a total of 1172 participants in the survey, 268 (22.87%) had physical comorbidities which was more in participants who suffered from COVID-19 infection, that is, 30.65% as compared to those who did not develop COVID-19 infection but witnessed the infection in a family member 85 (16.83%) (Table 2, Fig. 3). However, physical comorbidities, diabetes, and hypertension were 46% among total participants which was 76 (41.53%) in those who suffered from COVID-19 infection and 47 (55.29%) in those who did not develop COVID-19 infection but witnessed the infection in a family member which was clinically not significant (Table 2).

Out of the total survey sample of 1172 persons, 940 (80.20%) had received at least one dose of the COVID-19 vaccine. There was no significant difference in the vaccination pattern among those who suffered from COVID-19 infection: 469 (78.56%) as compared to those who did not develop COVID-19 infection but witnessed the infection in a family member, 471 (81.91%). The fear of COVID-19 vaccination was found in 106 (17.75%) and of side effects of the vaccine was found in 182 (13.48%) participants who had suffered

from COVID-19 infection as compared to 68 (11.83%) and 137 (23.83%), respectively, in those who did not develop COVID-19 infection but witnessed the infection in a family member (Table 2, Fig. 4).

The diagnosis of COVID-19 infection in those who suffered from the illness was mainly by RT-PCR test: 386 (64.66%) but 111 (18.59%) participants were diagnosed by more than one diagnostic tests (Table 2, Fig. 5).

In terms of COVID-19-related variables, about four-fifth (81.41%) of the participants were treated at home, whereas about one-fifth (18.6%) were hospitalized for the COVID-19 infection and one-tenth required oxygen support while going through the acute phase of COVID-19 infection. Only less than 1% required admission in the intensive care units. Most of the patients who got admitted to the hospital required admission for up to 2 weeks. All other data obtained including comorbidities are recorded in Table 2 and Figure 5.

The comparison of various psychiatric morbidities as mentioned in Table 3 suggests that about one-fourth of those who developed

Table 2: Medical comorbidities, vaccination pattern, confusion or fear of vaccination, side effect of vaccination, and home-based or hospital-based treatment received

| <i>Variables</i> | <i>Whole sample frequency (%)/mean (SD) (N = 1172)</i> | <i>Persons who developed COVID-19 infection frequency (%)/mean (SD) (N = 597)</i> | <i>Persons who witnessed COVID-19 infection frequency (%)/mean (SD) (N = 575)</i> | <i>Chi-square test/ t-test value</i> |
|--|--|---|---|--|
| Do you have any medical illness? (apart from COVID-19) | | | | |
| Yes | 268 (22.87%) (0.42) | 183 (30.65%) (0.42) | 85 (16.83%) (0.41) | 41.827 (14.71) |
| No | 904 (77.13%) (0.41) | 414 (69.35%) (0.417) | 420 (83.17%) (0.42) | |
| Asthma | 6 (2.24%) (2.33) | 4 (2.18%) (2.31) | 2 (2.35%) (2.33) | 50.736 (9.50) |
| Chronic kidney disease | 2 (0.75%) (2.3) | 0 | 2 (2.35%) (2.31) | |
| Diabetes | 50 (18.66%) (2.36) | 33 (18.03%) (2.36) | 17 (20%) (2.35) | |
| Dyslipidemia or hypercholesterolemia | 6 (2.24%) (2.1) | 6 (3.28%) (2.1) | 0 | |
| Epilepsy | 5 (1.86%) (2.35) | 3 (1.09%) (2.4) | 2 (2.35%) (1.74) | |
| Hypertension | 73 (27.24%) (2.37) | 43 (23.50%) (2.37) | 30 (35.29%) (2.38) | |
| Hypo- or hyperthyroidism | 16 (5.97%) (2.33) | 11 (6.01%) (2.33) | 5 (5.88%) (2.30) | |
| Ischemic heart disease | 8 (2.98%) (2.22) | 7 (3.82%) (2.34) | 1 (1.18%) (0.00) | |
| Obesity | 1 (0.37%) (0.00) | 1 (0.55%) (0.00) | 0 | |
| Stroke | 9 (3.36%) (2.35) | 6 (3.28%) (2.35) | 3 (3.53%) (2.34) | |
| Others (please specify) | 13 (4.85%) (2.38) | 10 (5.46%) (2.39) | 3 (3.53%) (2.40) | 2.075 (15.66) |
| More than one | 85 (31.72%) (2.5) | 62 (33.88%) (2.6) | 23 (27.06%) (2.4) | |
| Vaccinated | | | | |
| Yes | 940 (80.20%) (0.38) | 469 (78.56%) (0.5) | 471 (81.91%) (0.49) | 8.182 (0.406) |
| No | 232 (19.80%) (0.37) | 128 (21.44%) (0.38) | 104 (18.09%) (0.39) | |
| Confusion and fear of vaccination | | | | |
| Yes | 174 (14.85%) (0.79) | 106 (17.75%) (0.78) | 68 (11.83%) (0.794) | 9.236 (5.535) |
| No | 780 (66.55%) (0.788) | 385 (64.49%) (0.79) | 395 (68.69%) (0.77) | |
| Not applicable | 218 (18.60%) (0.794) | 106 (17.76%) (0.79) | 112 (19.48%) (0.795) | |
| Side effect of vaccine | | | | |
| Yes | 319 (27.22%) (0.78) | 182 (30.48%) (0.781) | 137 (23.83%) (0.78) | NA |
| No | 626 (53.41%) (0.78) | 294 (49.25%) (0.77) | 332 (57.74%) (0.782) | |
| Not applicable | 227 (19.37%) (0.77) | 121 (20.27%) (0.783) | 106 (18.43%) (0.784) | |
| Diagnosis of COVID | | | | |
| RTPCR | | 386 (64.66%) (1.21) | | NA |
| Rapid Test | | 67 (11.22%) (1.2) | | |
| CT-thorax | | 8 (1.34%) (1.19) | | |
| More than 1 test | | 111 (18.59%) (1.2) | | |
| Not Applicable | | 25 (4.19%) (1.19) | | |
| Home treatment for COVID-19 | | 486 (81.41%) | | NA |
| Hospitalization for COVID-19 | | 111 (18.59%) (18.6) | | |
| Required oxygen support during the COVID-19 infection | | 55 (9.21%) (9.2) | | |
| Hospitalization to ICU due to COVID-19 infection | | 5 (0.84%) (0.8) | | NA |
| Duration of stay in the hospital | | | | |
| <1 week | | 41 (36.94%) (6.9) | | NA |
| Between 1 and 2 weeks | | 58 (52.25%) (9.7) | | |
| Between 2 and 4 weeks | | 9 (8.11%) (1.5) | | |
| >4 weeks | | 3 (2.70%) (0.5) | | |

CT, computerize tomography

COVID-19 had depression and that of higher severity (25.9% vs 17.6%, $p = 0.001^{***}$; mild 24.96% vs 16.35%, moderate 15.08% vs 9.92%, moderately severe 7.20% vs 5.22%, severe 3.69% vs 2.43%, $p < 0.001^{***}$), which was significantly higher than those who did not develop COVID-19 themselves (Fig. 6). Similarly, about one-fourth of the persons who developed COVID-19 infection also had anxiety

disorder and higher proportion of them had more severe anxiety (23.6% vs 15.6%, $p < 0.001^{***}$, mild 25.96% vs 17.04%, moderate 14.57% vs 10.61%, severe 9.05% vs 4.87%, $p < 0.001^{***}$), which was significantly higher than those who did not develop COVID-19 themselves (Fig. 7). Compared to those who did not develop COVID-19 infection themselves, a higher proportion of those who

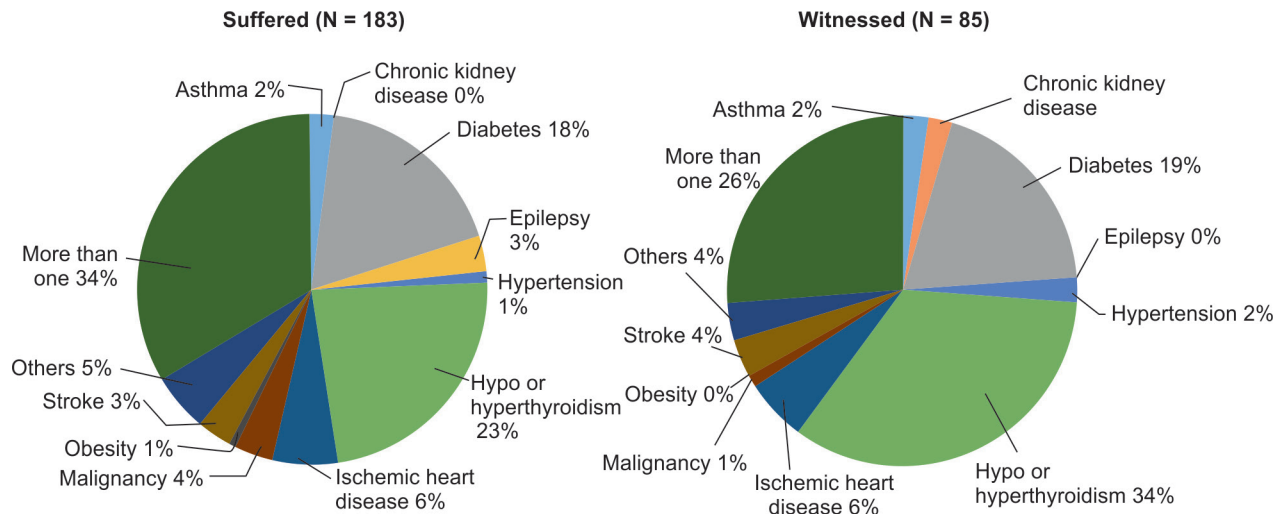


Fig. 3: Out of a total of 1,172 participants in the survey, 268 (22.87%) had physical comorbidities, which was more in participants who had suffered from COVID-19 infection, that is, 30.65% as compared to those who did not develop COVID-19 infection but witnessed the infection in a family member 85 (16.83%)



Fig. 4: Among the total 1,172 in the survey sample, 940 (80.20%) had received at least one dose of the COVID-19 vaccine. There was no significant difference in the vaccination pattern among those who had suffered from the COVID-19 infection 469 (78.56%) as compared to those who had not developed COVID-19 infection but witnessed the infection in a family member 471 (81.91%). The fear of COVID-19 vaccination was found in 106 (17.75%) and side effect of vaccine was found in 182 (13.48%) participants who had suffered from COVID-19 infection as compared to 68 (11.83%) and 137 (23.83%), respectively, in those who had not developed the COVID-19 infection but witnessed the infection in a family member

developed COVID-19 demonstrated higher level of resilient coping (27.81% vs 23.13%, $p < 0.05^*$). However, those who developed COVID-19 infection and those who did not develop the infection did not differ significantly in terms of fear of COVID-19 resilience (Table 3, Figs 8 to 10).

Other neuropsychiatric issues among both COVID sufferers and witnessed participants have been tabulated in Table 4. Compared to those who did not develop COVID-19 infections, a higher proportion of those who developed COVID-19 infection reported intense recollection or flashbacks of illness, trying to avoid memories, thoughts, or feelings

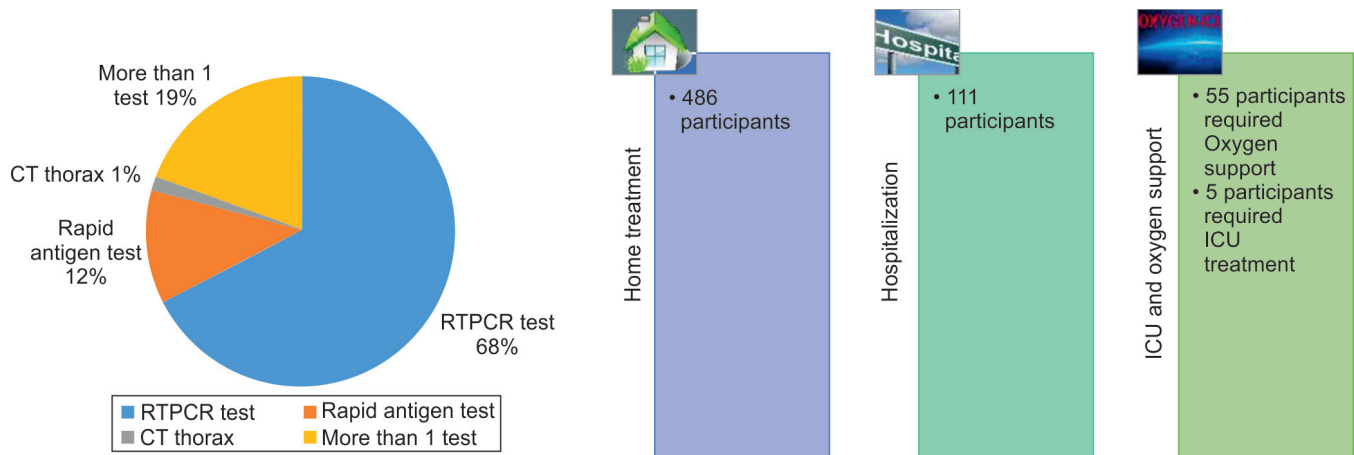


Fig. 5: The diagnosis of COVID-19 infection in those who had suffered from the illness was mainly by RT-PCR test was 386 (64.66%) whereas 111 (18.59%) participants were diagnosed by more than one diagnostic tests [Table 2]. In terms of COVID-19-related variables, about four-fifth (81.41%) of the participants were treated at home whereas about one-fifth (18.6%) were hospitalized for the COVID-19 infection and one-tenth required oxygen support while going through the acute phase of COVID-19 infection. Only less than 1% required admission in the intensive care units. Most of the patients who got admitted to the hospital required admission for up to 2 weeks. All other data obtained including comorbidities are recorded in Table 2

Table 3: Psychiatric morbidity among those with COVID-19 infection and those who witnessed the COVID-19 infection in a relative

| Psychiatric morbidity | Whole sample frequency (%) / mean (SD) (N = 1172) | Persons who developed COVID-19 infection frequency (%) / mean (SD) (N = 597) | Persons who witnessed COVID-19 infection frequency (%) / mean (SD) (N = 575) | Chi-squared test/t-test value |
|--|---|---|---|----------------------------------|
| Mean PHQ-9 score | 5.23 (6.04) | 6.11 (6.11) | 4.31 (5.82) | |
| Mean GAD-7 score | 4.64 (5.82) | 5.56 (5.71) | 3.68 (5.19) | |
| Depression present (PHQ-9 score ≥ 10) | 256 (21.8) | 155 (25.9%) | 101 (17.6) | 12.1 ($p = 0.001^{***}$) |
| Severity of depression | | | | |
| Minimal depression | 673 (57.42) | 293 (49.07) | 380 (66.09) | 34.79 ($p < 0.001^{***}$) |
| Mild depression | 243 (20.73) | 149 (24.96) | 94 (16.35) | |
| Moderate depression | 147 (12.54) | 90 (15.08) | 57 (9.91) | |
| Moderately severe depression | 73 (6.23) | 43 (7.20) | 30 (5.22) | |
| Severe depression | 36 (3.07) | 22 (3.69) | 14 (2.43) | |
| Anxiety disorder present (GAD-7 score ≥ 10) | 230 (19.6) | 141 (23.6) | 89 (15.6) | 12.3 ($p < 0.001^{***}$) |
| Severity of anxiety | | | | |
| Minimal anxiety | 689 (58.79) | 301 (50.42) | 388 (67.48) | 36.23 ($p < 0.001^{***}$) |
| Mild anxiety | 253 (21.59) | 155 (25.96) | 98 (17.04) | |
| Moderate anxiety | 148 (12.63) | 87 (14.57) | 61 (10.61) | |
| Severe anxiety | 82 (6.99) | 54 (9.05) | 28 (4.87) | |
| Fear of COVID-19 scale score | | | | |
| Low | 1089 (92.92) | 554 (92.8) | 535 (93.04) | 0.027 ($p = 0.87$) |
| High | 83 (7.08) | 43 (7.2) | 40 (6.96) | |
| Brief Resilience Scale (BRS) score | | | | |
| Low | 654 (55.80) | 320 (53.6) | 334 (58.09) | 3.77 ($p = 0.15$) |
| Normal | 497 (42.41) | 264 (44.22) | 224 (38.9) | |
| High | 30 (2.56) | 13 (2.18) | 17 (2.96) | |
| Brief Resilient Coping Scale score | | | | |
| Low | 544 (46.41) | 257 (43.05) | 287 (49.91) | 5.98 ($p = 0.05^*$) |
| Normal | 329 (28.07) | 174 (29.15) | 155 (26.96) | |
| High | 299 (25.51) | 166 (27.81) | 133 (23.13) | |

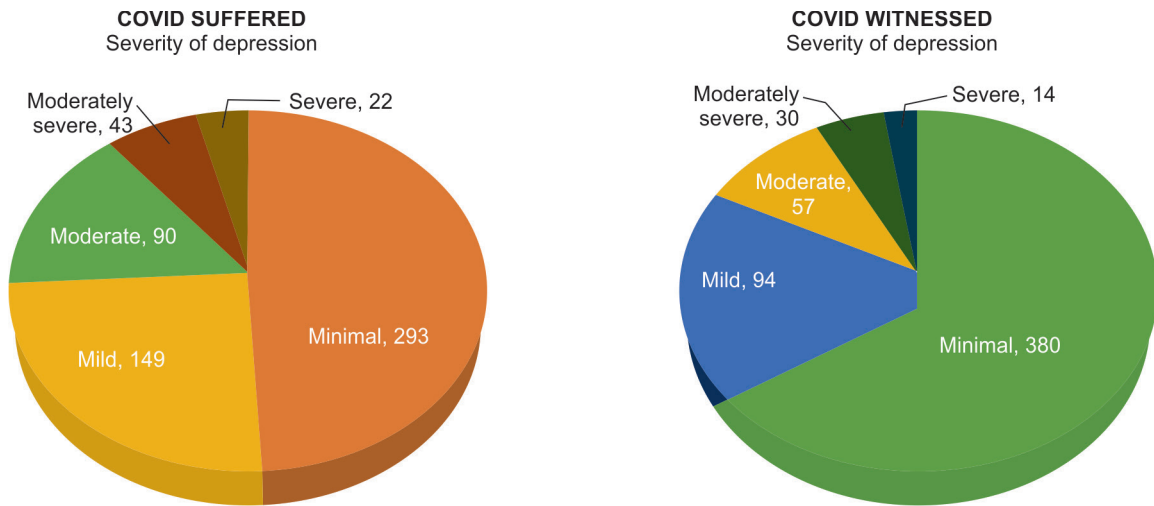


Fig. 6: The comparison of various psychiatric morbidities as mentioned in Table 3 suggests that about one-fourth of those who developed COVID-19 had depression and that of higher severity (25.9% vs 17.6%, $p = 0.001^{***}$; mild 24.96% vs 16.35%, moderate 15.08% vs 9.92%, moderately severe 7.20% vs 5.22%, severe 3.69% vs 2.43%, $p < 0.001^{***}$), which was significantly higher than those who did not develop COVID-19 themselves

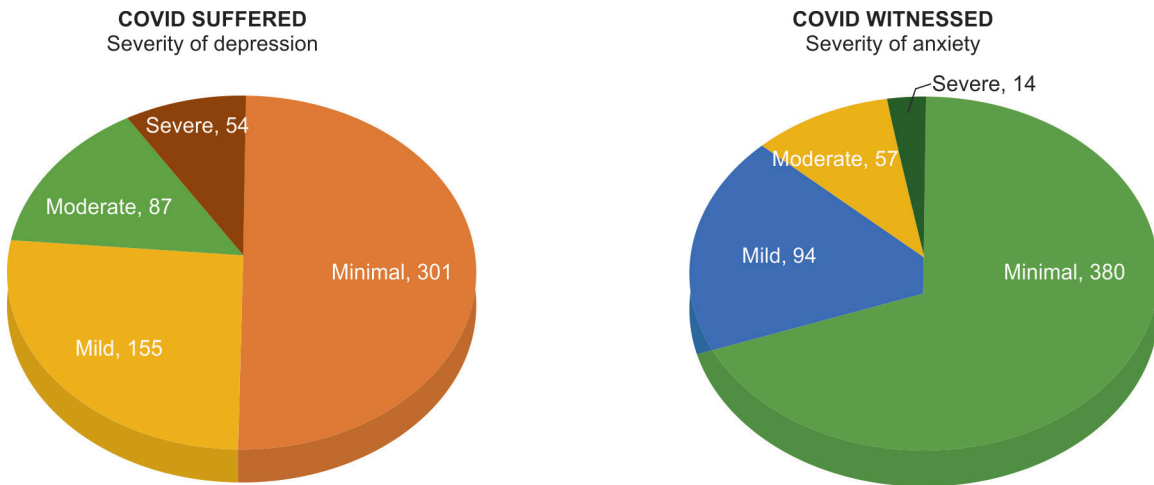


Fig. 7: About one-fourth of the persons who developed COVID-19 infection also had anxiety disorder and higher proportion of them had more severe anxiety (23.6% vs 15.6%, $p < 0.001^{***}$; mild 25.96% vs 17.04%, moderate 14.57% vs 10.61%, severe 9.05% vs 4.87%, $p < 0.001^{***}$), which was significantly higher than those who did not develop COVID-19 themselves

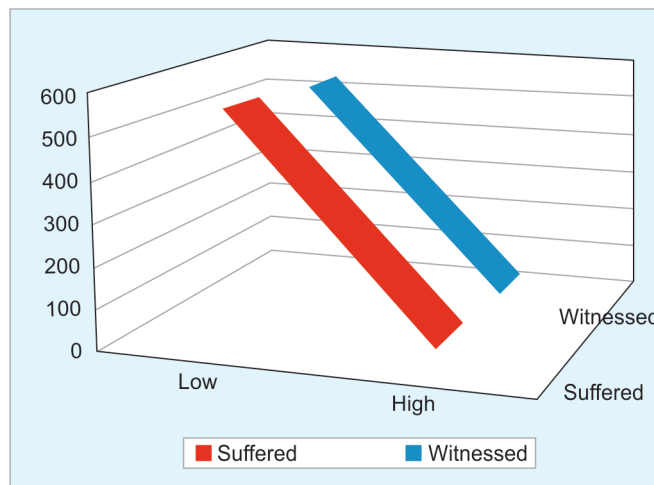


Fig. 8: Compared to those who developed COVID-19 infection and those who did not develop the infection, the data did not differ significantly in terms of fear of COVID-19 scale (FCV-19S)

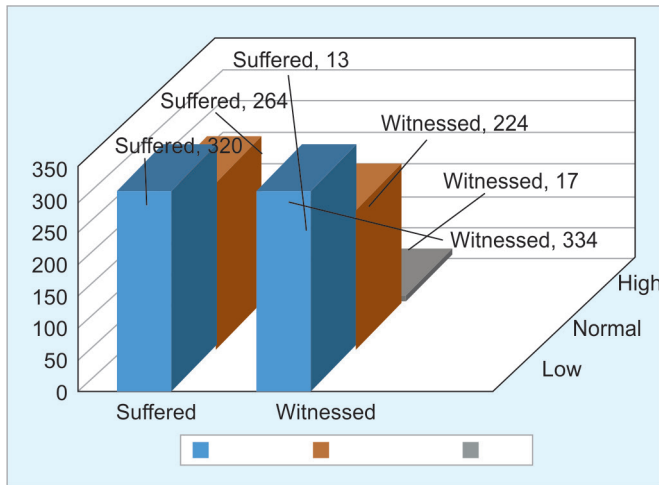


Fig. 9: Compared to those who did not develop COVID-19 infection themselves, a lower proportion of those who developed COVID-19 demonstrated higher level of resilience (2.96 vs 2.18 $p = 0.15$)

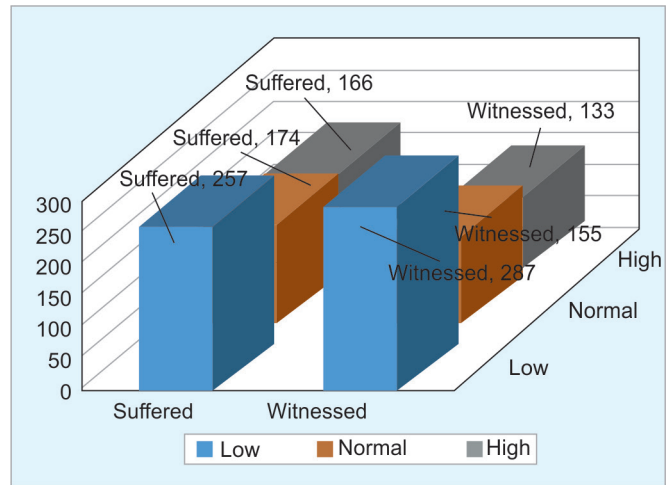


Fig. 10: Compared to those who did not develop COVID-19 infection themselves, higher proportion of those who developed COVID-19 demonstrated higher level of resilient coping (27.81 vs 23.13 $p < 0.05^*$)

Table 4: Other neuropsychiatric issues among those with COVID-19 infection and those who witnessed the COVID-19 infection in a relative

| Variables | Whole sample frequency (%) / mean (SD) (N = 1172) | Persons who developed COVID-19 infection frequency (%) / mean (SD) (N = 597) | Persons who witnessed COVID-19 infection frequency (%) / mean (SD) (N = 575) | Chi-squared test/ t-test value |
|--|---|---|---|---------------------------------------|
| Intense recollection or flashbacks of illness when in dreams or awake states | | | | |
| Not at all | 991 (84.6%) | 488 (81.7%) | 503 (87.5%) | 7.76 (<i>p</i> = 0.05 [†]) |
| Several days | 108 (9.2%) | 63 (10.5%) | 45 (7.8%) | |
| More than half of the days | 54 (4.6%) | 34 (5.7%) | 20 (3.5%) | |
| Nearly everyday | 19 (1.6%) | 12 (2.0%) | 7 (1.2%) | |
| Repeated, disturbing, and unwanted memories of the stressful experience | | | | |
| Not at all | 959 (81.8%) | 473 (79.2%) | 486 (84.5%) | 5.8 (<i>p</i> = 0.122) |
| Several days | 129 (11.0%) | 77 (12.9%) | 52 (9.0%) | |
| More than half of the days | 61 (5.2%) | 34 (5.7%) | 27 (4.7%) | |
| Nearly everyday | 23 (1.9%) | 13 (2.2%) | 10 (1.7%) | |
| Avoiding memories, thoughts, or feelings related to the stressful experience | | | | |
| Not at all | 945 (80.6%) | 462 (77.4%) | 483 (84.0%) | 9.67 (<i>p</i> = 0.02 [†]) |
| Several days | 132 (11.3%) | 83 (13.9%) | 49 (8.5%) | |
| More than half of the days | 69 (5.9%) | 38 (6.4%) | 31 (5.4%) | |
| Nearly everyday | 26 (2.2%) | 14 (2.3%) | 12 (2.1%) | |
| Panic attacks (sudden, intense anxiety that lasts for a short length of time) | | | | |
| Not at all | 1023 (87.3%) | 521 (87.3%) | 502 (87.3%) | 2.45 (<i>p</i> = 0.48) |
| Several days | 89 (7.6%) | 48 (8.0%) | 41 (7.1%) | |
| More than half of the days | 51 (4.3%) | 22 (3.7%) | 29 (5.0%) | |
| Nearly everyday | 9 (0.8%) | 6 (1%) | 3 (0.5.0%) | |
| Increase in obsession with cleanliness | | | | |
| Not at all | 903 (77.1%) | 448 (75.0%) | 455 (79.1%) | 5.89 (<i>p</i> = 0.117) |
| Several days | 137 (11.7%) | 79 (13.2%) | 58 (10.1%) | |
| More than half of the days | 92 (7.9%) | 52 (8.7%) | 40 (7.0%) | |
| Nearly everyday | 40 (3.4%) | 18 (3.0%) | 22 (3.8%) | |
| Obsession with cleanliness troubled other people | | | | |
| Not at all | 1008 (86.0%) | 506 (84.8%) | 502 (87.3%) | 2.1 (<i>p</i> = 0.55) |
| Several days | 104 (8.9%) | 58 (9.7%) | 46 (8.0%) | |
| More than half of the days | 47 (4.0%) | 27 (4.5%) | 20 (3.5%) | |
| Nearly everyday | 13 (1.1%) | 6 (1%) | 7 (1.2%) | |

(Contd...)

Table 4: (Contd...)

| Variables | Whole sample frequency (%) / mean (SD) (N = 1172) | Persons who developed COVID-19 infection frequency (%) / mean (SD) (N = 597) | Persons who witnessed COVID-19 infection frequency (%) / mean (SD) (N = 575) | Chi-squared test/ t-test value |
|--|---|---|---|-----------------------------------|
| Repetitive washing routines, repetitive checking behavior, uncomfortable religious and sexual thoughts/recurrent intrusive thoughts/impulses/images | | | | |
| Not at all | 983 (83.9%) | 489 (81.9%) | 494 (85.9%) | 3.79 ($p = 2.85$) |
| Several days | 118 (10.1%) | 67 (11.2%) | 51 (8.9%) | |
| More than half of the days | 53 (4.5%) | 30 (5.0%) | 23 (4.0%) | |
| Nearly everyday | 18 (1.5%) | 11 (1.8%) | 7 (1.2%) | |
| Concerned about bodily symptoms (e.g., body aches and pains, feeling of a lump in throat, feeling of choking, jerky breathing, etc.) | | | | |
| Not at all | 985 (84.0%) | 488 (81.7%) | 497 (86.4%) | 7.8 ($p = 0.05$) |
| Several days | 100 (8.5%) | 64 (10.7%) | 36 (6.3%) | |
| More than half of the days | 66 (5.6%) | 35 (5.9%) | 31 (5.4%) | |
| Nearly everyday | 21 (1.8%) | 10 (1.7%) | 11 (1.9%) | |
| Worry that your loved ones will die at the hands of COVID-19 | | | | |
| Not at all | 872 (74.4%) | 426 (71.4%) | 446 (77.6%) | 6.71 ($p = 0.08$) |
| Several days | 124 (10.6%) | 67 (11.2%) | 57 (9.9%) | |
| More than half of the days | 133 (11.3%) | 78 (13.1%) | 55 (9.6%) | |
| Nearly everyday | 43 (3.7%) | 26 (4.4%) | 17 (3.0%) | |
| Experience of any elevated mood or euphoria for at least 1 week | | | | |
| Not at all | 1047 (89.3%) | 538 (90.1%) | 509 (88.5%) | 2.33 ($p = 0.505$) |
| Several days | 68 (5.8%) | 35 (5.9%) | 33 (5.7%) | |
| More than half of the days | 45 (3.8%) | 20 (3.3%) | 25 (4.3%) | |
| Nearly everyday | 12 (1.00%) | 4 (0.7%) | 8 (1.4%) | |
| Increased energy or constant urge to do many things | | | | |
| Not at all | 1035 (88.3%) | 533 (89.3%) | 502 (87.3%) | 1.41 ($p = 0.701$) |
| Several days | 75 (6.4%) | 34 (5.7%) | 41 (7.1%) | |
| More than half of the days | 46 (3.9%) | 23 (3.8%) | 23 (4.0%) | |
| Nearly everyday | 16 (1.4%) | 7 (1.2%) | 9 (1.6%) | |
| Feeling alone or left out | | | | |
| Not at all | 988 (84.3%) | 495 (82.9%) | 493 (85.7%) | 3.37 ($p = 0.337$) |
| Several days | 96 (8.2%) | 49 (8.2%) | 47 (8.2%) | |
| More than half of the days | 74 (6.3%) | 45 (7.5%) | 29 (5.04%) | |
| Nearly everyday | 14 (1.2%) | 8 (1.3%) | 6 (1.0%) | |
| Brain operating slowly | | | | |
| Not at all | 987 (84.2%) | 487 (81.6%) | 500 (87.0%) | 13.7 ($p = 0.003^{**}$) |
| Several days | 107 (9.1%) | 65 (10.9%) | 42 (7.3%) | |
| More than half of the days | 62 (5.3%) | 31 (5.2%) | 31 (5.4%) | |
| Nearly everyday | 16 (1.40%) | 14 (2.3%) | 2 (0.3%) | |
| Forgetfulness | | | | |
| Not at all | 958 (81.7%) | 468 (78.4%) | 490 (85.2%) | 9.48 ($p = 0.024^*$) |
| Several days | 115 (9.8%) | 69 (11.6%) | 46 (8.0%) | |
| More than half of the days | 74 (6.3%) | 44 (7.4%) | 30 (5.2%) | |
| Nearly everyday | 25 (2.1%) | 16 (2.7%) | 9 (1.6%) | |
| Felt that it was hard to hold things, write or button your shirt | | | | |
| Not at all | 1071 (91.4%) | 545 (91.3%) | 526 (91.5%) | 4.74 ($p = 0.192$) |
| Several days | 57 (4.9%) | 30 (5.0%) | 27 (4.7%) | |
| More than half of the days | 34 (2.9%) | 14 (2.3%) | 20 (3.5%) | |
| Nearly everyday | 10 (0.9%) | 8 (1.3%) | 2 (0.35%) | |

| | | | | |
|---|--------------|-------------|-------------|---------------------------|
| Recent onset shaking of hands | | | | |
| Not at all | 1060 (90.5%) | 541 (90.6%) | 519 (90.3%) | 0.547 (<i>p</i> = 0.908) |
| Several days | 63 (5.4%) | 30 (5.0%) | 33 (5.7%) | |
| More than half of the days | 37 (3.20%) | 19 (3.2%) | 18 (3.1%) | |
| Nearly everyday | 12 (1.0%) | 7 (1.2%) | 5 (0.9%) | |
| New-onset fits (seizures or epilepsy) | | | | |
| Not at all | 1097 (93.6%) | 568 (95.1%) | 529 (92.0%) | 8.35 (<i>p</i> = 0.039*) |
| Several days | 40 (3.4%) | 12 (2.0%) | 28 (4.9%) | |
| More than half of the days | 29 (2.5%) | 13 (2.2%) | 16 (2.8%) | |
| Nearly everyday | 6 (0.5%) | 4 (0.7%) | 2 (0.3%) | |
| Persistent headache | | | | |
| Not at all | 1007 (85.9%) | 503 (84.3%) | 504 (87.6%) | 2.70 (<i>p</i> = 0.439) |
| Several days | 94 (8.0%) | 55 (9.2%) | 39 (6.8%) | |
| More than half of the days | 58 (4.9%) | 32 (5.4%) | 26 (4.5%) | |
| Nearly everyday | 13 (1.1%) | 7 (1.2%) | 6 (1.0%) | |
| Experience sudden onset dizziness (head spinning) | | | | |
| Not at all | 1009 (86.1%) | 502 (84.1%) | 507 (88.2%) | 4.26 (<i>p</i> = 0.235) |
| Several days | 107 (9.1%) | 63 (10.5%) | 44 (7.6%) | |
| More than half of the days | 43 (3.7%) | 24 (4.0%) | 19 (3.3%) | |
| Nearly everyday | 13 (1.1%) | 8 (1.3%) | 5 (0.9%) | |

related to the stressful experience, reported brain operating slowly, forgetfulness, persistent headache, and new-onset seizures (Table 4).

DISCUSSION

This survey aimed to evaluate the psychological impact of going through the COVID-19 infection and compared the same with a group of people who themselves did not develop the infection but witnessed the same in one of their relatives.

Available data from different parts of the world suggest that there is an increase in the prevalence of psychiatric manifestations in the form of depression, anxiety, insomnia, PTSD, and fatigue in persons who have suffered from COVID-19 infection. The prevalence of depression/depressed mood in different meta-analysis has been reported to vary from 12.8% to 14.8% and that for anxiety has been reported to be 12.3–34%.^{15,16}

The present study suggests that about one-fourth of the people who developed COVID-19 infection are suffering from depression and another one-fourth are suffering from anxiety disorder, with prevalence of both the disorders being higher among those who developed COVID-19 infection compared to those who themselves did not develop the infection but witnessed the same in one of their relatives. When we compare the findings of the present study with the existing literature from different parts of the world, it can be said that the findings of the present study are in consonance with the existing literature from other parts of the world. This suggests that there is an urgent need to reorganize the mental health services to provide care to people with post-COVID or long-COVID symptoms. These findings suggest that the mental health professionals should be an integral part of the multidisciplinary teams involved in the care of patients with long-COVID.

Existing data also suggest a high prevalence of PTSD and other neurological symptoms during the post-COVID phase.^{15,16} In the present study, we did not use a specific validated instrument to assess PTSD, but the findings of the present study suggest that compared to those who did not develop COVID-19 infections, a higher proportion of persons who had gone through the COVID-19 infection reported intense recollection or flashbacks

of illness, trying to avoid memories, thoughts, or feelings related to the stressful experience, persistent headache, and new-onset seizures. Hence, it can be said that the findings of the present study also support the existing literature. These findings suggest that clinicians involved in the care of patients with COVID-19 after the acute phase should regularly screen these patients for PTSD and other neurological features. Additionally, the psychiatrists should regularly enquire about COVID-19 infection in persons presenting with the recent onset psychiatric manifestations and also enquire about symptoms of PTSD in these patients and also consider the possible underlying neurological issues in these patients which may be contributing to the psychiatric manifestations.

The findings of the present study also support the emerging literature of impact of COVID-19 on cognitive functioning. This suggest that there is a need to improve the awareness of the general public about this issue and public health measures needs to be implemented to reduce the negative impact of the COVID-19 on the cognitive functioning.

The present study has certain limitations, which include being an online survey based on the snowball sampling method. The diagnosis of depression and anxiety were based on the use of screening instruments and not the diagnostic instruments. The present study did not evaluate the post-COVID or long-COVID symptoms involving other body organs, which can also have a significant impact on the psychiatric morbidity. The study can also be confounded by the time delay between onset and disease encounter and the time of survey.

CONCLUSION

The findings of our study suggest that there is an urgent need to focus on the mental health consequences of the COVID-19 infection and the clinicians involved in the care of post-COVID-19 patients should be made aware about the mental health outcomes. Further, there is a need to provide multidisciplinary care to people who have gone through the COVID-19 infection to prevent and manage the post-COVID or long-COVID symptoms.

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ORCID

Gundugurti Prasad Rao  <https://orcid.org/0000-0003-2954-4290>

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