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Psychiatry

Patients with schizophrenia have decreased COVID-19 prevalence among hospitalised patients with psychiatric and neurological diseases: A retrospective analysis in Mexican population

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Abstract

Background: Increased coronavirus disease 2019 (COVID-19) incidence and mortality in hospitalised patients with psychiatric and neurologic disorders have been reported.

Methods: The clinical records of 198 patients with psychiatric and neurological disorders hospitalised in the Dr Rafael Serrano Psychiatric Hospital in Puebla during the peak of the first wave of the COVID-19 pandemic in Mexico were analysed for psychiatric or neurologic diagnosis, gender, age, medical diagnosis, and COVID-19 prevalence. For patients with COVID-19, the effects of gender, and medical diagnosis were explored.

Results: There was an increased COVID-19 prevalence in the studied population (43.94%), compared with the national Mexican (~0.21% to 0.63%) and worldwide average in the general population (~0.13% to 4.28%). However, the mortality rate (5.75%) was lower than that reported in Mexico (11.28%-13.55%), which was higher than the worldwide average (2.95%-4.98%). We detected increased COVID-19 prevalence in patients with comorbidities (odds ratios [OR] 0.4; 95% CI: 0.2-1, $P = .0447$). Moreover, patients with schizophrenia spectrum disorders have a decreased predisposition to COVID-19 (OR 0.4, 95% CI: 0.2-0.8; $P = .0250$), as opposed to patients with intellectual disability that are predisposed to COVID-19 (OR 2.2, 95% CI: 0.2-0.8; $P = .0434$), in comparison with the rest of the hospital population.

Conclusion: The prevalence of COVID-19 in hospitalised patients with psychiatric disorders is increased compared with that of the general population; however, a lower mortality rate was detected. Also, an increased risk of COVID-19 was detected in patients with comorbidities. Interestingly, the observed variation in COVID-19 prevalence in patients with schizophrenia and intellectual disability was not associated with age or other specific medical diagnoses.

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1 | INTRODUCTION

It is known that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causal agent of the coronavirus disease 2019 (COVID-19), has neurotropic properties.¹⁻³ Upper respiratory tract infections caused by SARS-CoV-2 may lead to brain infection via the olfactory bulb.^{4,5} Once in the brain, SARS-CoV-2 causes inflammation and disrupts the integrity of the brain-blood barrier.^{2,6-9}

1.1 | Psychiatric and neurological outcomes in COVID-19

Moreover, several mental diseases have been associated with COVID-19, including anxiety, depression, and psychotic episodes, as well as cerebrovascular events.¹⁰⁻¹³ In a study of the New York City population, it was detected that 13.5% of COVID-19 patients have neurological symptoms.¹⁴ Also, another study that analysed 236 379 patients with COVID-19 reported that around one-third of these patients developed psychiatric or neurological disorders.¹⁵ In such a manner, COVID-19 is not only a risk factor for the development of mental disease but also psychiatric and neurological symptoms that are also part of the outcome of the disease.

Neurological disturbances caused by SARS-CoV-2 infection suggest that people diagnosed with mental diseases may be vulnerable to COVID-19. There is miscellaneous information about COVID-19 prevalence in psychiatric patients. It has been reported that people with a psychiatric diagnosis are susceptible to COVID-19 in the US¹⁶ and UK populations.¹⁷ Lee et al¹⁸ did not find increased COVID-19 prevalence in psychiatric patients in the South Korean population, but these results have been questioned because of the variability of diagnostic criteria.¹⁹ However, the impact of sociodemographic variables on COVID-19 prevalence cannot be neglected, since some reports indicate that COVID-19 prevalence and the outcome are affected by belonging to ethnic minorities and the lack of public health service access in both the general population²⁰ and people with mental diseases.²¹

In this report, we analysed the prevalence of COVID-19 in hospitalised patients with psychiatric and neurological diseases grouped into schizophrenia spectrum disorders, intellectual disability, bipolar disorders, substance-related and addictive disorders, neurocognitive disorders, and neurological disorders, to detect if any specific diagnosis is associated with an increase in COVID-19 prevalence.

2 | METHODS

2.1 | Study design

This cohort study was conducted at Dr Rafael Serrano Psychiatric Hospital of the Secretary of Health in Puebla, Mexico. Data were

What's known

- Patients with psychiatric or neurological diseases seem to be vulnerable to coronavirus disease 2019 (COVID-19), evidenced by increased mortality.

What's new

- Increased risk for COVID-19, but a decreased risk of mortality due to severe acute respiratory syndrome coronavirus 2 infection was detected in hospitalized patients with psychiatric or neurological diseases, in comparison with the national and worldwide scenario.
- Moreover, among these hospitalized patients, the ones diagnosed with schizophrenia are less susceptible to COVID-19, and patients with intellectual disability are more susceptible to COVID-19.

obtained from 198 hospitalised psychiatric patients from 29 June to 30 September 2020, which corresponds to the peak of the first wave of the pandemic in Mexico. All procedures described in this study were approved by the Research Ethics Committee of the "Hospital Psiquiátrico Dr Rafael Serrano" (6.2/21/01) and are in accordance with the Guide for the Execution of Research Projects of Health in Human Beings (NOM-012-SSA3-2012) and with the Helsinki Declaration of 1975. Moreover, all data were analysed anonymously, according to ethical standards in biomedical research.

All the patients of this study were already admitted to the hospital at the time of the study. For these patients, we extracted psychiatric diagnostic codes from the electronic health records. Patients were categorised into five categories according to the 10th revision of the International Statistical Classification of Diseases (ICD10) as follows: schizophrenia spectrum disorders (F20, F21, and F22), intellectual disability (F70, F71, and F72), bipolar disorders (F31), substance-related and addictive disorders (F10, F11, and F18), neurocognitive disorders (F05 and R41), and neurological disorders (F03 and G40). The characteristics of the psychiatric population of the hospital are shown in Table 1.

2.2 | COVID-19 protocol

After a clinical examination and direct or indirect questioning for COVID-19, polymerase chain reaction tests for SARS-CoV-2 were only performed in patients who had been in contact with a person who had tested positive for COVID-19, or which presented or referred COVID-19-related symptoms; this was applied for admitted and hospitalised patients. Not all the patients were tested for COVID-19. In such a manner, only patients who were tested for COVID-19 were selected for the prevalence study (Figure 1). The baseline characteristics of

TABLE 1 Characteristics of the hospital population

| Characteristics | No. (%) | | | | | | |
|-----------------------------|---|-----------------------------------|---------------------------|---|----------------------------------|-------------------------------|--|
| | Schizophrenia spectrum disorders (n = 56) | Intellectual disability (n = 114) | Bipolar disorders (n = 9) | Substance-related and addictive disorders (n = 7) | Neurocognitive disorders (n = 5) | Neurological diseases (n = 7) | |
| Sex | | | | | | | |
| Male | 19 (34.0) | 57 (50.0) | 9 (100) | 6 (85.7) | 2 (40.0) | 5 (71.4) | |
| Female | 37 (66.0) | 57 (50.0) | — | 1 (14.3) | 3 (60.0) | 2 (28.6) | |
| Age (y) | | | | | | | |
| Mean (SD) | 55.20 (15.36) | 50.68 (15.85) | 54.29 (13.66) | 50.14 (6.23) | 69 (17.18) | 56.86 (12.19) | |
| 18-65 | 39 (69.64) | 92 (80.70) | 8 (88.89) | 7 (100) | 1 (20.0) | 5 (71.43) | |
| >65 | 17 (30.36) | 22 (19.3) | 1 (11.11) | — | 4 (80.0) | 2 (28.57) | |
| Medical diagnosis | | | | | | | |
| No comorbidities | 40 (71.43) | 55 (48.24) | 6 (66.67) | 5 (71.43) | 3 (60.0) | 4 (57.14) | |
| Diabetes | 3 (5.36) | 3 (2.63) | 1 (11.11) | — | 1 (20.0) | — | |
| Hypertension | 3 (5.36) | 12 (10.53) | 1 (11.11) | 1 (14.28) | — | — | |
| Heart failure | 1 (1.78) | — | — | — | — | — | |
| Hypothyroidism | 8 (14.28) | 17 (14.91) | 1 (11.11) | 1 (14.28) | — | 1 (14.28) | |
| Hyperthyroidism | — | — | 1 (11.11) | — | — | 0 (NA) | |
| Epilepsy | 1 (1.78) | 42 (36.84) | — | — | 1 (20.0) | 3 (42.86) | |
| Asthma | — | 1 (0.88) | — | — | — | — | |
| COVID-19 tested | 37 (66.07) | 77 (67.54) | 7 (77.78) | 6 (85.71) | 2 (40.0) | 6 (85.71) | |
| Positive | 18 (48.65) | 56 (72.73) | 6 (85.71) | 3 (50.0) | 1 (50.0) | 3 (50.0) | |
| Positivity:negativity ratio | 0.95:1 | 2.67:1 | 6:1 | 1:1 | 1:1 | 1:1 | |

Abbreviation: COVID-19, coronavirus disease 2019; SD, standard deviation.

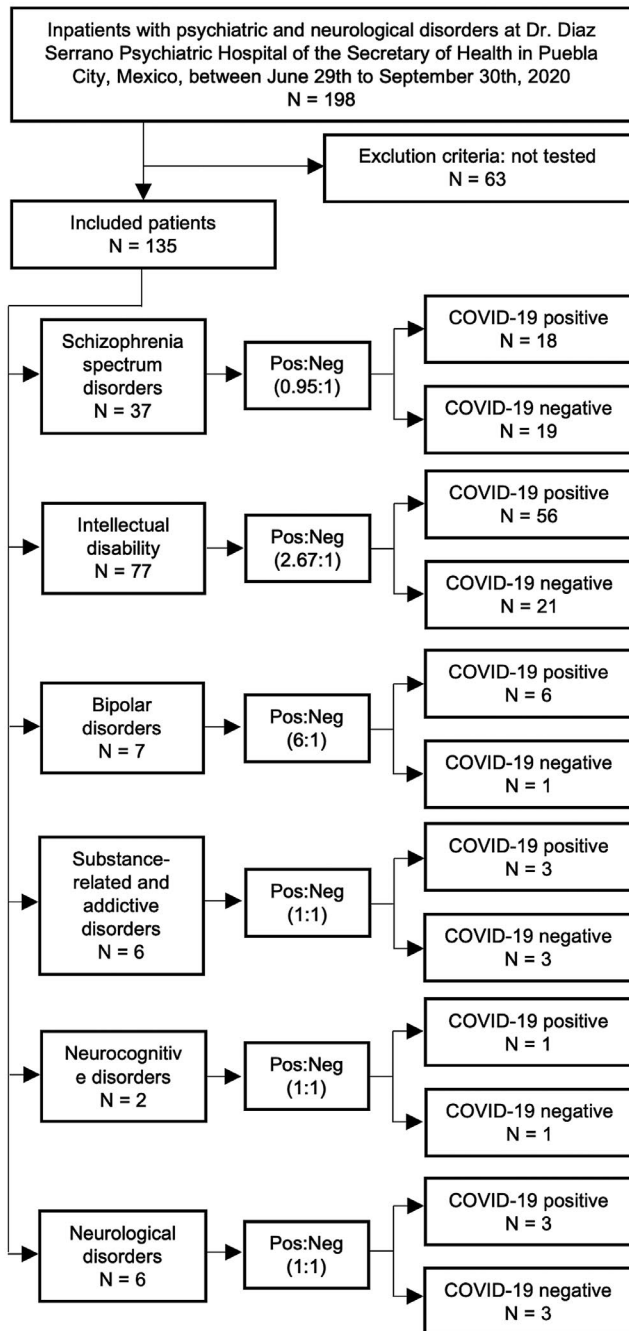


FIGURE 1 Study design

the selected patients for the prevalence study are shown in Table 2.

Coronavirus disease 2019 was classified according to the symptoms as follows: asymptomatic (no symptoms), mild (fever, cephalgia, cough,odynophagia, rhinorrhea, and asthenia), moderate (pneumonia), and severe groups (severe pneumonia and needing O₂ supplementation).²² Patients who were suspected of, or confirmed with having COVID-19, were isolated in private rooms in the same hospital. Patients with moderate and severe COVID-19 were transferred to an intensive care unit in a special COVID-19 hospital in the city.

2.3 | Statistical analysis

Continuous variables were expressed as mean and standard deviation (SD). Categorical variables were expressed as counts and percentages. Fisher's exact test (two-sided) was used to compare gender, psychiatric diagnosis, and medical diagnosis between each diagnosis against the rest of the psychiatric population. Also, unadjusted odds ratios (OR) were calculated for gender, psychiatric diagnosis, and medical diagnosis as risk factors for COVID-19 prevalence in the patients with psychiatric or neurological disorders, as well as for gender and medical diagnosis in schizophrenia spectrum disorder and intellectual disability groups. The P-value for statistical significance was established at 0.05. Data analysis was carried out in GraphPad Prism 9.0.

3 | RESULTS

3.1 | Baseline characteristics of the studied population

The characteristics of the hospital population are shown in Table 1. Between 29 June to 30 September 2020, from a total hospitalised population of 198 patients, 135 were tested for COVID-19 (68.18%). Of the tested patients, 87 were positive for COVID-19 (64.44%), of which 46 were females (52.87%) and 41 were males (47.13%); with a mean age of 51.57 years (SD = 14.89). The COVID-19 prevalence in the hospital population was 43.94%.

3.2 | COVID-19 prevalence in patients with psychiatric and neurologic disorders

The baseline characteristics of the patients with positive COVID-19 test results are shown in Table 2. Of patients with psychiatric disorders and COVID-19, 18 were diagnosed with a schizophrenia spectrum disorder (20.69%; positivity:negativity ratio = 1:1), 56 with intellectual disability (64.37%; positivity:negativity ratio = 2.7:1), 6 with bipolar disorder (6.9%; positivity:negativity ratio = 6:1), 3 with substance-related and addictive disorder (3.45%; positivity:negativity ratio = 1:1), 1 with neurocognitive illness (1.14%; positivity:negativity ratio = 1:1), and 3 with neurological disease (3.45%; positivity:negativity ratio = 1:1).

3.3 | COVID-19 symptoms and aftermaths in patients with psychiatric and neurologic disorders

Of the 87 patients with COVID-19, 32 were asymptomatic (36.78%), 42 developed mild symptoms (39.08%), 7 presented moderate clinical outcomes (18.39%), and 5 severe cases were detected (5.75%). Most patients with schizophrenia spectrum disorders were asymptomatic (n = 9, 50.0%) in contrast with patients with mild symptoms (n = 5, 27.78%), while in patients with intellectual disability, the opposite occurred—the majority developed mild symptoms (n = 26,

TABLE 2 Baseline characteristics of patients with positive COVID-19 test results

| Characteristics | No. (%) | | | | | | | |
|-------------------|---|----------------------------------|---------------------------|---|----------------------------------|-------------------------------|--|--|
| | Schizophrenia spectrum disorders (n = 18) | Intellectual disability (n = 56) | Bipolar disorders (n = 6) | Substance-related and addictive disorders (n = 3) | Neurocognitive disorders (n = 1) | Neurological diseases (n = 3) | | |
| Male | 5 (27.78) | 30 (53.57) | — | 3 (100) | 1 (100) | 2 (66.67) | | |
| Age (y) | | | | | | | | |
| Mean (SD) | 54.5 (12.39) | 49.13 (15.54) | 52.67 (14.21) | 54.67 (2.08) | 73 (NA) | 67.33 (11.59) | | |
| 18–65 | 13 (72.23) | 46 (82.14) | 5 (83.34) | 3 (100) | — | 1 (33.34) | | |
| >65 | 5 (27.77) | 10 (17.86) | 1 (16.66) | — | 1 (100) | 2 (66.66) | | |
| Medical diagnosis | | | | | | | | |
| No comorbidities | 10 (55.56) | 29 (51.78) | 3 (50.0) | 2 (66.67) | 1 (100) | — | | |
| Diabetes | 1 (5.56) | 2 (3.57) | 1 (10.66) | — | — | — | | |
| Hypertension | 1 (5.56) | 8 (14.28) | 1 (10.66) | — | — | — | | |
| Hypothyroidism | 6 (33.34) | 6 (10.71) | 1 (10.66) | 1 (33.33) | — | 1 (33.33) | | |
| Hyperthyroidism | — | — | 1 (10.66) | — | — | — | | |
| Epilepsy | — | 20 (35.71) | — | — | — | 3 (100) | | |
| COVID-19 symptoms | | | | | | | | |
| Asymptomatic | 9 (50.0) | 18 (32.14) | 2 (33.33) | 1 (33.33) | — | 2 (66.67) | | |
| Mild | 5 (27.77) | 26 (46.43) | 1 (16.67) | 2 (66.67) | — | — | | |
| Moderate | 3 (16.57) | 9 (16.07) | 3 (50.0) | — | — | 1 (33.33) | | |
| Severe | 1 (5.56) | 3 (5.36) | — | — | 1 (100) | — | | |
| ICU | | | | | | | | |
| Transfers | 4 (22.23) | 12 (21.43) | 3 (50.0) | — | — | 1 (33.33) | | |
| Days, mean (SD) | 11.75 (11.87) | 13.33 (10.96) | 13.67 (4.04) | — | — | 29 (NA) | | |
| Aftermaths | | | | | | | | |
| Lung damage | 1 (5.55) | 2 (3.57) | — | — | — | — | | |
| Asthenia | — | 1 (1.78) | — | — | — | — | | |
| Dyspnea | — | 1 (1.78) | — | — | — | — | | |
| CVE | — | — | 1 (16.67) | — | — | — | | |
| Deaths | 2 (11.10) ^a | 2 (3.57) ^b | — | — | 1 (100) | — | | |

Abbreviations: CVE, cerebrovascular event; COVID-19, coronavirus disease 2019; ICU, intensive care unit; SD, standard deviation.

^aOne death with epilepsy as comorbidity.

^bBoth deaths with epilepsy and hypothyroidism as comorbidities.

| Risk factor | OR (95% CI) | P value |
|---|-----------------|---------|
| Male (41/63) | 1.0 (0.5-1.9) | 0.8799 |
| Psychiatric/neurologic diagnosis | | |
| Schizophrenia spectrum disorders (18/37) | 0.4 (0.2-0.8) | 0.0250 |
| Intellectual disability (56/77) | 2.2 (1.1-4.5) | 0.0434 |
| Bipolar disorders (6/7) | 3.4 (0.5-39.8) | 0.4228 |
| Substance-related and addictive disorders (3/6) | 0.5 (0.1-2.3) | 0.4207 |
| Neurocognitive disorders (1/2) | 0.5 (0.02-10.4) | >0.9999 |
| Neurological diseases (3/6) | 0.5 (0.1-2.3) | 0.4228 |
| Medical diagnosis | | |
| No comorbidities (45/87) | 0.4 (0.2-1) | 0.0447 |
| Diabetes (4/6) | 1.1 (0.2-5.9) | >0.9999 |
| Hypertension (10/12) | 2.9 (0.7-13.7) | 0.2138 |
| Hypothyroidism (15/21) | 1.4 (0.5-3.9) | 0.6214 |
| Epilepsy (23/30) | 2.0 (0.8-5.2) | 0.1364 |

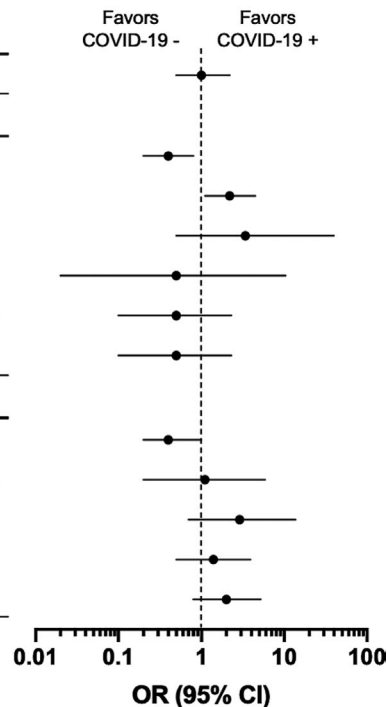


FIGURE 2 Risk factors associated with COVID-19 diagnosis in hospitalised patients with psychiatric or neurological disorders. COVID-19, coronavirus disease 2019

| Risk factor | OR (95% CI) | P value |
|--------------------------|-----------------|---------|
| Male (5/18) | 0.5 (0.1-2.2) | 0.4951 |
| Medical diagnosis | | |
| No comorbidities (10/18) | 0.6 (0.2-2.6) | 0.7086 |
| Diabetes (1/18) | 1.1 (0.05-21.1) | >0.9999 |
| Hypertension (1/18) | 1.1 (0.05-21.1) | >0.9999 |
| Hypothyroidism (6/18) | 4.2 (0.8-22.6) | 0.1245 |

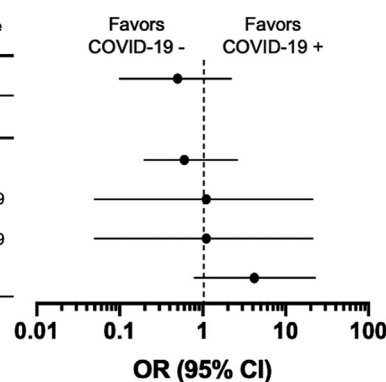


FIGURE 3 Risk factors associated with COVID-19 diagnosis in hospitalised patients with schizophrenia spectrum disorders. COVID-19, coronavirus disease 2019

46.43%). Twenty patients (22.99%) were transferred to the intensive care unit, of which 4 were from the schizophrenia spectrum disorder group (22.23%), 12 the intellectual disability group (21.43%), 3 the bipolar disorder group (50%), and 1 the neurological diseases group (33.33%). Aftermaths resulting from COVID-19 were detected in 6 patients (6.9%), including 3 with lung damage, 1 with asthenia, 1 with dyspnea, and 1 with a cerebrovascular event. Patients with COVID-19 aftermaths had schizophrenia spectrum disorders ($n = 1$, 5.56%), intellectual disability ($n = 4$, 7.14%), and bipolar disorder diagnosis ($n = 1$, 16.67%).

3.4 | COVID-19 mortality in patients with psychiatric and neurologic disorders

Five deaths caused by COVID-19 were reported (6.9%), of which 2 were in patients diagnosed with schizophrenia spectrum disorders

(11.10%), 2 with intellectual disability (3.57%), and 1 with neurocognitive disorder (100%). However, during the time under study, 4 other patients diagnosed with intellectual disability died because of atypical pneumonia, 2 of them were not tested and 2 of them tested negative for COVID-19.

3.5 | COVID-19 prevalence varies among psychiatric diagnoses: decrease in patients with schizophrenia and increase in patients with intellectual disability

Among psychiatric diagnoses (Figure 2), patients with schizophrenia spectrum disorders had a decreased prevalence of COVID-19 compared with other psychiatric conditions (OR 0.4, 95% CI: 0.2-0.8, $P = .0250$). On the other hand, patients with intellectual disabilities were associated with an increase in COVID-19

FIGURE 4 Risk factors associated with COVID-19 diagnosis in hospitalised patients with intellectual disability. COVID-19, coronavirus disease 2019

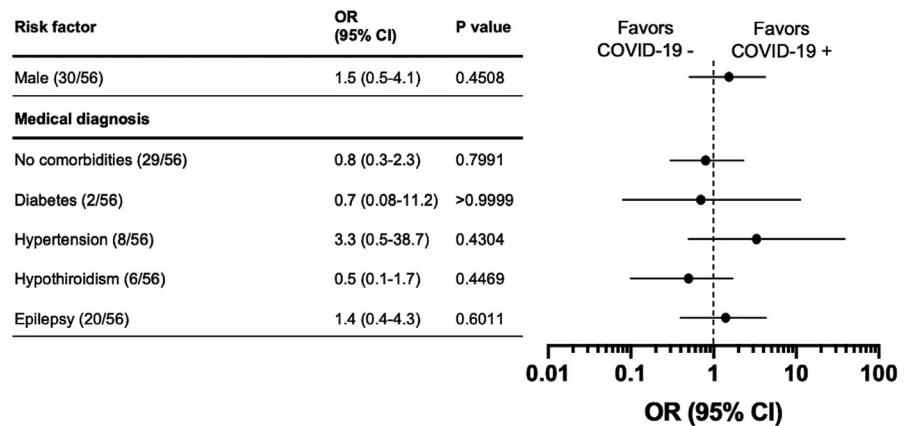


TABLE 3 Mexican and worldwide COVID-19 data used for comparisons

| Mexico ^a | 29 June 2020 | 30 September 2020 |
|------------------------------|--------------|-------------------|
| COVID-19 tested | 596 168 | 1 748 357 |
| COVID-19 positive | 271 900 | 808 439 |
| Positivity rate (%) | 45.61 | 46.24 |
| COVID-19 deaths | 36 853 | 91 218 |
| Mortality rate (%) | 13.55 | 11.28 |
| Worldwide^b | | |
| COVID-19 positive | 10 009 310 | 34 034 818 |
| COVID-19 deaths | 498 163 | 1 002 871 |
| Mortality rate (%) | 4.98 | 2.95 |

Abbreviation: COVID-19, coronavirus disease 2019.

^aRef.²³

^bRef.²⁴

prevalence compared with other psychiatric conditions (OR 2.2; 95% CI: 1.1-4.5, $P = .0434$). Patients with no comorbidities are less prone to SARS-CoV-2 infection (OR 0.4; 95% CI: 0.2-1, $P = .0447$). However, neither gender nor specific medical diagnosis was associated with an increase in COVID-19 prevalence (Figure 2).

Moreover, neither gender, nor comorbidities, nor specific medical diagnosis was associated with an increase in the prevalence of COVID-19 in patients with schizophrenia spectrum disorders (Figure 3) or intellectual disability (Figure 4).

4 | DISCUSSION

To our knowledge, this is the first study that analyses the prevalence of COVID-19 among hospitalised patients with psychiatric or neurological disease diagnoses in the Mexican population. Our data indicate that in the studied cohort of patients, the ones with schizophrenia spectrum disorder diagnosis may have a decreased prevalence of COVID-19, while patients with intellectual disability may be susceptible to SARS-CoV-2 infection.

Although we did not have a non-psychiatric/neurologic group to compare our findings, and this represents a limitation of our work, in the next two sections, we contextualise our data with the COVID-19 statistics for the general Mexican and worldwide population from 29 June to 30 September 2020 (Table 3).

4.1 | COVID-19 prevalence in patients with psychiatric and neurological disorders, in comparison with the Mexican and worldwide general situation

The percentage of positivity for COVID-19 among the psychiatric hospitalised tested population (64.44%) was higher than the general population Mexican positivity percentage during the studied period (45.61%-46.24%; for details, see Table 3).²³ Moreover, the COVID-19 prevalence in the studied psychiatric population (43.94%) was higher than the Mexican (~0.21%-0.63%) and worldwide (~0.13%-4.28%) confirmed COVID-19 prevalence in the general population during the studied period.^{23,24} These results confirm the susceptibility of patients with psychiatric and neurological disorders to SARS-CoV-2 infection. Also, it has been reported that schizophrenia patients not only have an increased risk of SARS-CoV-2 infection²⁵ but also increased COVID-19-related mortality,²⁶⁻²⁹ which can be even three times higher than in control patients.²⁶

4.2 | COVID-19-related deaths in patients with psychiatric and neurological disorders, in comparison with the Mexican and worldwide general situation

Regarding the rate mortality of COVID-19 in this cohort of patients (5.75%), it is lower than that reported in the general Mexican population (13.55%-11.28%),²³ which is higher than the worldwide mortality (4.98%-2.95%) in the studied period (for details, see Table 3). Antonio-Villa et al³⁰ evaluated the COVID-19 pandemic in Mexico City and reported that the mortality rate is higher in people in active economically active sectors and of marginalised municipalities with a high population density. This reinforces the reports that sustain

that socioeconomic conditions are a determining factor for mortality and the outcome of COVID-19 worldwide.²⁰ However, increased mortality in the hospitalised psychiatric population has been documented.^{26,27} Interestingly, in the cohort of patients studied in this research, only five deaths caused by COVID-19 were reported, representing 6.9% of the positive cases. This can be explained by the isolation protocols for suspicious and positive patients with COVID-19. Another factor that may have contributed to the COVID-19 outcome reported here is that this psychiatric hospital, as well as other Mexican mental health institutions, does not have to be converted into COVID units, as has been documented in other countries.^{31,32}

Moreover, patients with schizophrenia disorders have an increased COVID-19-related death rate (11.10%) in comparison with patients with intellectual disability (3.57%). This can be explained by the proportion of people over 65 with COVID-19, which is higher in the schizophrenia disorder group (27.77%) than in the intellectual disability group (17.86). This is congruent with the information about COVID-19 mortality, which is higher in patients age 65 years or older.³³⁻³⁵

4.3 | Risk factors for SARS-CoV-2 infection and COVID-19 mortality

We found that the presence of comorbidities in patients with psychiatric or neurologic disorders favours SARS-CoV-2 infection. This is congruent with several reports that have associated comorbidities, including hypertension and diabetes, with an increased incidence and mortality in COVID-19.³⁶ Interestingly, neither hypertension nor diabetes seems to represent a risk factor for SARS-CoV-2 infection or the development of severe COVID-19 and did not affect the mortality rate in this cohort of patients.

The proportion of patients over 65 years of age with COVID-19 and schizophrenia spectrum disorders is 27.77%, which is higher than patients with COVID-19 and intellectual disability (17.86%). However, patients with schizophrenia spectrum disorders with moderate (16.57%) or severe (5.56) COVID-19 symptoms did not vary with patients with intellectual disability: moderate (16.07%) or severe (5.36%) COVID-19 symptoms. Interestingly, in the schizophrenia spectrum disorder group, asymptomatic COVID-19 (50%) increased in comparison with that of the intellectual disability group (32.14%). The opposite was detected in patients with mild COVID-19 symptoms; their proportion was higher in the intellectual disability group (46.43%) than in the schizophrenia spectrum disorder group (27.77%). These results suggest that age may not be associated with moderate or severe COVID-19 symptoms in these patients, but study limitations cannot be neglected to influence these results (see Section 5).

4.4 | Hypothesis about the low SARS-CoV-2 infection rate in patients with schizophrenia

Here, we analysed the association of psychiatric diagnosis with COVID-19 predisposition, finding that schizophrenia spectrum

disorder patients have a decreased COVID-19 predisposition and intellectual disability patients have an increased COVID-19 predisposition compared with other psychiatric patients. Specifically, in schizophrenia, increased COVID-19 prevalence has been reported compared with that of patients without a psychiatric diagnosis.²⁶ However, in a couple of recent reports, the Crespo-Facorro group has detected decreased mortality in patients with schizophrenia treated with antipsychotics in the Spanish population,^{37,38} and our results support this finding. Among the diverse reasons that can explain the aforementioned findings, we hypothesise that the pharmacotherapy of schizophrenia may be related to this,³⁹ since antipsychotics (mainly second-generation or atypical ones) have anti-inflammatory, antioxidant, and neurotropic properties.⁴⁰ However, it is important to remember that antipsychotics can also prompt the development of metabolic-related diseases such as obesity and diabetes.⁴¹ Thus, further studies must study the role of these drugs on the COVID-19 outcomes.

4.5 | Perspectives

Although a low prevalence of patients with COVID-19 effects was detected (6.9%), it will be interesting to follow up with the patients who tested positive for the SARS-CoV-2 infection, since extensive evidence about its neurotropic properties and its neuroinflammatory effects have been documented.^{1-4,6,9} Also, neurological symptoms have been reported in patients with COVID-19.^{11,14,42} Thus, it will be interesting to assess the long-term effects of COVID-19 in patients with mental diseases.

4.6 | Limitations of the study

In addition to the previously mentioned lack of a non-psychiatric/neurologic group for analysis, psychiatric and COVID-19 treatment information was not included. Moreover, obesity has been associated with increased COVID-19 mortality, which has been confirmed in the Mexican population^{36,43,44}; in this cohort of patients, body mass index was not evaluated to explore the role of obesity in COVID-19 outcomes. Also, the study was not powered to detect statistical significance for all comparisons. Thus, the absence of significance should not necessarily imply non-association. Finally, the baseline male/female proportion was not equivalent; this could bias the presented data (unknown to us).

5 | CONCLUSIONS

This study indicates that although the cohort of hospitalised psychiatric patients studied has an increased positivity ratio of COVID-19, mortality did not vary in comparison with that of the Mexican general population. Moreover, among the general psychiatric population, the presence of comorbidities increased the risk

of SARS-CoV-2 infection. However, patients with schizophrenia spectrum disorder diagnosis are less susceptible to COVID-19. This is the opposite in patients with intellectual disabilities, who are susceptible to COVID-19. These data may contribute to the worldwide efforts for mental health care in the COVID-19 pandemic.

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DISCLOSURE

The authors declared no conflict of interest.

AUTHOR CONTRIBUTIONS

Hiram Tendilla-Beltrán and Gonzalo Flores conceived and designed the study, performed the statistical analysis, and wrote the first draft of the manuscript. Ángel Roberto Rivas-Ramírez and Hiram Tendilla-Beltrán acquired, analysed, and interpreted the data. Ángel Roberto Rivas-Ramírez, Laura Eréndira Gómez-Mendoza, and Guillermo Loaiza provided administrative, technical, and material support. All the authors contributed to the critical revision of the manuscript for important intellectual content and approved the final version of the manuscript. Guillermo Loaiza and Gonzalo Flores supervised the research. All authors had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding authors, upon reasonable request.

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