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Observational Study

Prevalence and clinical characteristics of COVID-19 in inpatients with schizophrenia in Wuhan, China

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statement: The investigation was carried out in accordance with the latest version of the Declaration of Helsinki. The Wuhan Youfu Hospital received approval for this study from the institutional review board of the Institute of Psychology, Chinese Academy of Sciences. Given the urgent need for data collection and retrospective research, no written informed consent was required for these

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Abstract

BACKGROUND

In contrast to many Western countries, China has maintained its large psychiatric hospitals. The prevalence and clinical characteristics of coronavirus disease 2019 (COVID-19) in inpatients with schizophrenia (SCZ) are unclear.

AIM

To assess the prevalence of COVID-19 among inpatients with SCZ and compare the infected to uninfected SCZ patients in a Wuhan psychiatric hospital.

METHODS

We retrospectively collected demographic characteristics and clinical profiles of all SCZ patients with COVID-19 at Wuhan's Youfu Hospital.

RESULTS

Among the 504 SCZ patients, 84 had COVID-19, and we randomly sampled 174 who were uninfected as a comparison group. The overall prevalence of COVID-19 in SCZ patients was 16.7%. Among the 84 SCZ patients with confirmed COVID-19, the median age was 54 years and 76.2% were male. The most common

current analyses.

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symptom was fever (82%), and less common symptoms were cough (31%), poor appetite (20%), and fatigue (16%). Compared with SCZ patients without COVID-19, those with COVID-19 were older ($P = 0.006$) and significantly lighter ($P = 0.002$), and had more comorbid physical diseases ($P = 0.001$). Surprisingly, those infected were less likely to be smokers (< 0.001) or to be treated with clozapine ($P = 0.03$). Further logistic regression showed that smoking [odds ratio (OR) = 5.61], clozapine treated (OR = 2.95), and male (OR = 3.48) patients with relatively fewer comorbid physical diseases (OR = 0.098) were at a lower risk for COVID-19. SCZ patients with COVID-19 presented primarily with fever, but only one-third had a cough, which might otherwise be the most common mode of transmission between individuals.

CONCLUSION

Two unexpected protective factors for COVID-19 among SCZ inpatients are smoking and clozapine treatment.

Key Words: Mental health; Schizophrenia; Inpatient; Epidemiology

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Core Tip: In contrast to many Western countries, China has maintained its large psychiatric hospitals. The prevalence and clinical characteristics of coronavirus disease 2019 (COVID-19) in inpatients with schizophrenia (SCZ) are unclear. Our aim was to assess the prevalence of COVID-19 among inpatients with SCZ and compare the infected to uninfected SCZ patients in a Wuhan psychiatric hospital. Two unexpected protective factors for COVID-19 among SCZ inpatients are smoking and clozapine treatment.

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INTRODUCTION

On December 8, 2019, several cases of acute respiratory illness with unknown etiology were reported in Wuhan, Hubei Province, China[1-4], which is now well-known as coronavirus disease 2019 (COVID-19) pneumonia (CP)[4-6]. By early January, 2020, the Chinese Center for Disease Control and Prevention (CDC) identified the coronavirus from samples of bronchoalveolar lavage fluid of a patient in Wuhan[2]. Among the initially identified COVID-19 patients, most (73%) were men, and their clinical symptoms included fever (98%), cough (76%), dyspnoea (55%), and myalgia or fatigue (44%) with less common symptoms being secretion of sputum, headache, and diarrhea. All CP patients had abnormal chest CT manifestations, and 63% had lymphopenia. Some CP patients had complications such as acute respiratory distress syndrome (ARDS), acute cardiac injury, and secondary infection. Six (15%) of the 41 hospitalized CP cases died[1]. A subsequent study of COVID-19 patients confirmed the association in older men with medical comorbidities[3]. Common symptoms included fever (99%), fatigue (70%), and dry cough (59%). Laboratory tests showed that 70% had lymphopenia, and chest CT displayed bilateral patchy shadows or ground glass opacity in the lungs of all patients. As of February 3, the overall mortality was 4.3%[4]. The most recent report from the Chinese CDC on the initially confirmed 425 CP patients in Wuhan found a slightly higher percentage of men (56%) and a median age of 59 years. The estimated contagion number was 2.2 with a 95% confidence interval (CI) of 1.4-3.9[5], which is substantially greater than that of influenza or severe acute respiratory syndrome (SARS), and predicts robust human to human transmission through respiratory spread[7-8].



Schizophrenia (SCZ) is one of the most common severe mental disorders, characterized by positive and negative symptoms and cognitive impairment, affecting about 1% of the world's population[9-10]. In China, the prevalence of SCZ is similar, suggesting that genetic factors may play a critical role in the occurrence of this disease [11-12]. Given the huge population of 1.3 billion in China, the number of SCZ individuals is very large. Compared with the number of 20000 psychiatrists in China, the number of SCZ patients is much larger. Therefore, in the large mental health hospitals in China, the resources for managing this COVID-19 epidemic are very limited, and these SCZ inpatients are expected to be highly contagious.

Therefore, we investigated the CP situation among SCZ inpatients in one of the major psychiatric hospitals in Wuhan during this COVID-19 pandemic with several major objectives. First, we sought to estimate the prevalence and clinical characteristics of the hospitalized SCZ patients with confirmed CP in Wuhan's public psychiatric hospitals. Second, we compared the clinical profiles, especially the potential risk and protective factors, among SCZ patients with *vs* without symptomatic COVID-19, some of whom went on to develop CP and a smaller percentage died from CP.

MATERIALS AND METHODS

Subjects

The Wuhan Youfu Hospital (Wuhan, Hubei Province, China) housed 586 psychiatric inpatients during the COVID epidemic. The first confirmed case of CP at this hospital occurred on January 8, 2020. As of February 29, 2020, there were 84 confirmed SCZ cases with CP at the hospital, and we included all CP cases in this study. After the first case emerged, the hospital set up isolation wards for COVID-19 patients, with airborne preventive measures, and immediately transferred all confirmed patients to these special wards.

There were eight wards in the hospital. In one ward, there were ten rooms with 60-80 hospitalized patients. The patients met each other among rooms in one ward. If one patient had COVID-19, he or she had an equal opportunity to make all other patients in the same room or at the same ward infected. Once a patient was found to have symptoms of fever or infection, the entire room was isolated on the spot. Then, the fever patient was transferred to a separate ward for isolation treatment, and other patients in the ward where the fever patient was located were isolated and observed in the room for 14 d.

Just 3 to 4 mo before the outbreak of COVID-19 in September, 2019, the Institute of Psychology, Chinese Academy of Sciences randomly recruited 174 patients with SCZ from Wuhan Youfu Hospital to conduct another study, which we used as an approximately two to one control group for comparison to the 84 schizophrenics with COVID-19 in this study.

The investigation was carried out in accordance with the latest version of the Declaration of Helsinki. The Wuhan Youfu Hospital received approval for this study from the institutional review board of the Institute of Psychology, Chinese Academy of Sciences. Given the urgent need for data collection and retrospective research, no written informed consent was required for these current analyses.

Data collection

We designed a special Case Record Form to collect general information, socio-demographic data, and clinical, laboratory, radiological, and treatment data from electronic medical records for all psychiatric patients with and without confirmed COVID-19. Two researchers independently reviewed the data collection forms to confirm the accuracy of the data collected. If there were any ambiguous data related to COVID-19, such as epidemiological data, we made additional interviews with patients or their family members.

COVID-19 was diagnosed according to the World Health Organization (WHO) interim guidelines[13], and was confirmed by real-time reverse transcription-polymerase chain reaction (RT-PCR) or next-generation sequencing assay of throat swab specimens[1]. The Wuhan CDC Laboratory confirmed COVID-19 before January 23, 2020, and the diagnosis was subsequently confirmed in certified tertiary care hospitals. RT-PCR testing followed the protocol set up by the WHO. Of 84 SCZ cases, 58 were laboratory-confirmed and the others were confirmed by chest radiography or computed tomography (CT) plus clinical symptoms. In addition, we defined the degree of severity of COVID-19 (severe *vs* non-severe) at the time of admission using the American Thoracic Society guidelines for community-acquired pneumonia[14].

We extracted additional data related to novel coronavirus from electronic medical records: History of exposure to novel coronavirus and possible pathway, clinical symptoms or signs, laboratory results, and chest radiologic assessments. Laboratory assessments included whole blood cell count, coagulation profile, and blood biochemical analysis (such as C-reactive protein, albumin/globulin ratio, creatinine kinase, myocardial enzymes, liver and renal function, blood glucose and lipid profiles, and electrolytes). In addition, we tested for seven types of common viruses (including influenza, avian influenza, respiratory syncytial virus, adenovirus, parainfluenza virus, SARS-CoV, and MERS-CoV) in throat swab specimens using real-time RT-PCR methods. Finally, most patients underwent chest CT or radiography as well as electrocardiograms when their physical condition indicated such testing.

Study outcomes

The main endpoints were transfer to a designated COVID-19 hospital due to development of a serious condition requiring a ventilator, or death. The secondary endpoints were the rate of death and the time from symptom onset to the main endpoints[6].

We defined ARDS and shock according to the WHO interim guidelines.

Statistical analysis

We express continuous variables as medians and interquartile ranges or simple ranges, as appropriate, and categorical variables as the number and percentages. Since all the demographic and clinical data are normally distributed (Kolmogorov-Smirnov one-sample test, $P > 0.05$), comparisons of demographic and clinical variables between different groups were performed using analysis of variance for continuous variables and chi-square test for categorical variables. We used analysis of covariance to control for confounding factors. We describe the prevalence of COVID-19 in both sexes with percentages and analyzed them by chi-square tests. A binary logistic regression analysis was performed to assess which factors were independently associated with COVID-19. We applied Bonferroni corrections to each test to adjust for multiple testing, and used SPSS (version 18.0, Chicago, IL, United States) to do all statistical analyses with a two-tailed significance level at 0.05.

RESULTS

Demographic and clinical features

By February 29, 2020, we identified 84 SCZ inpatients with COVID-19 at Wuhan Youfu Hospital. Of the 84 cases, 58 were laboratory-confirmed and the other 26 were confirmed by chest radiography or CT plus clinical symptoms. The prevalence of COVID-19 among the SCZ inpatients was 16.7% (84/504). The first two SCZ patients were diagnosed with COVID-19 on January 8, 2020. Table 1 shows the data for all 101 psychiatric patients with COVID-19.

Among all the 84 SCZ patients, 64 were male, and the age ranged from 19 to 81 years with a median age of 54 years. Besides their SCZ disorders, more than half ($n = 44$) of the patients with COVID-19 had comorbid physical diseases before they had COVID-19, including hypertension ($n = 22$), diabetes ($n = 8$), anemia ($n = 7$), leukopenia ($n = 7$), and cerebral infarction ($n = 2$).

The most common symptoms of the COVID-19 patients were fever (82%; the highest temperature of 40.5 °C, with 4 patients having a temperature ≥ 40 °C), cough (31%), poor appetite (20%), and fatigue (16%). Their fewer common symptoms were chest tightness (15%) and shortness of breath (11%); however, no patients reported nausea, vomiting, or diarrhea.

Radiologic and laboratory measurements

Among the 84 patients, 58 had CT scans, with 50 (86%) having abnormal manifestations. Among the 58 patients with CT scans, 38 (66%) had bilateral lung involvement. The most common manifestations of chest CT were ground-glass opacity (51%) and bilateral patchy shadowing (46%).

Blood samples were available from 81 patients and 46% had lymphocytopenia, 36% had neutropenia, 34% had leukopenia, and 12% had thrombocytopenia. In addition, 68% of patients had elevated C-reactive protein levels.

Table 1 Clinical characteristics of psychiatric inpatients with coronavirus disease 2019 based on disease severity

	All patients (n = 101)	Severe (n = 17)	Non-severe (n = 84)	<i>F</i> / χ^2	<i>P</i>
Age	54.8 ± 12.0	61.3 ± 14.1	53.4 ± 11.2	9.63	0.003
Median (IQR), years	56 (48-63)	65 (57-70)	55 (47-61)		
Distribution, years (%)				14.50	0.001
20-49	30 (29.7%)	2 (11.8%)	28 (33.3%)		
50-64	51 (50.5%)	6 (35.3%)	45 (53.6%)		
≥ 65	20 (19.8%)	9 (52.9%)	11 (13.1%)		
Male/female	72/29 (71.3%/28.7%)	10/7 (58.8%/41.2%)	62/22 (73.8%/26.2%)	1.55	0.21
Blood pressure					
Systolic pressure	122.2 ± 7.2	119.6 ± 6.8	122.8 ± 7.2	2.80	0.09
Diastolic pressure	77.2 ± 5.5	76.9 ± 4.4	77.2 ± 5.7	0.06	0.81
Diagnosis					
Schizophrenia	84	10	74		
Bipolar disorder	4	1	3		
Alzheimer's Disease	4	4	0		
Mental retardation	3	1	2		
Epileptic psychosis	3	0	3		
Organic mental disorder	3	1	2		
Weight (kg)	62.1 ± 10.3	55.8 ± 7.7	63.2 ± 10.4	1.62	0.21
Smoker/non-smoker	14/76	1/10	13/66	0.40	0.53
Duration of illness (yr)	27.9 ± 11.8	31.7 ± 14.4	27.4 ± 11.4	1.41	0.24
Age of onset (yr)	26.9 ± 11.0	34.3 ± 17.5	25.8 ± 9.4	2.56	0.11
Comorbid physical diseases	43 (48.8%)	13 (76.5%)	40 (47.6%)	4.72	0.03
Antipsychotics					
Clozapine	14 (13.9%)	3 (17.6%)	11 (13.1%)	0.25	0.62
Non-clozapine	87 (86.1%)	14 (82.4%)	73 (86.9%)		
Antipsychotic dose (mg) (chlorpromazine equivalents)	239.2 ± 156.2	191.0 ± 164.1	264.4 ± 160.8	3.16	0.08

COVID-19: Coronavirus disease 2019; IQR: The interquartile range.

Treatment

The hospital established isolation wards and once a patient showed suspicious symptoms of COVID-19, he/she received laboratory or radiological confirmation, and was transferred to these isolation wards. Among all the 84 patients, 70 received intravenous or oral antibiotic therapy; 55 took oseltamivir at 75 mg-150 mg/d, and 10 took umifenovir at 0.3-0.6 g/d. In addition, 14 and 3 patients received cephalosporin antibiotics and azithromycin, respectively, in combination with oseltamivir or alone. Finally, 17 patients received oxygen therapy and 3 received glucocorticoids.

Among all 84 patients, 13 developed respiratory distress syndrome (RDS), and the median duration from onset of COVID to RDS was 8 d (interquartile range, 5-13). Finally, 11 patients (13.1%) were admitted to an ICU at another hospital and 8 (9.5%) died.

Comparison of SCZ patients with and without COVID-19

Table 1 shows the demographic and clinical characteristics of the SCZ patients with and without COVID-19. Compared to patients without COVID-19, patients with COVID-19 were older ($P = 0.006$), had significantly lower weight ($P = 0.002$) and lower systolic pressure ($P = 0.005$), had more comorbid physical diseases ($P = 0.001$), and were less likely to be smokers ($P < 0.001$). Since there was a significant difference in

antipsychotic treatment between the two groups ($F = 14.1$, $DF = 6$, $P = 0.03$), we further divided the patients into a clozapine and non-clozapine treated group, and found a significant difference in the infection rates between the two groups (32% in non-COVID-19 *vs* 18% in COVID-19; $\chi^2 = 5.42$, $P = 0.02$). All these significant differences passed the Bonferroni corrections ($P < 0.05$) except for clozapine treatment ($P > 0.05$). In addition, there was a trend towards a higher proportion of female patients with COVID-19 ($P = 0.07$).

Table 2 shows results using logistic regression to adjust for these several significant characteristics distinguishing those with and without COVID-19. The following differences remained significant independent predictors: Comorbid physical diseases, smoking, clozapine treatment, and sex. As indicated by the odds ratios and beta weights, the schizophrenic patients with a lower risk for COVID-19 were clozapine treated males who smoked and had fewer comorbid physical diseases.

DISCUSSION

This first report about COVID-19 among SCZ inpatients contains three key findings. First, and most importantly, the mortality rate from CP of 9.5% among these SCZ inpatients is remarkably higher than that from COVID-19 found in the general population of this epidemic region[5-6]. Second, the most common symptom of COVID-19 in these patients was fever (82%) and the less common symptoms included cough (31%), poor appetite (20%), and fatigue (16%). Third, some unusual and relatively unexpected protective factors for lower rates of COVID-19 included being male and treatment with clozapine, as well as more smoking among these SCZ patients. In contrast to men and smokers, the general population is at a greater risk of contracting COVID-19 and its complications. The other association of risk for COVID-19 with more comorbid physical diseases is consistent with the general population during this epidemic.

The death rate of 9.5% in these SCZ patients with COVID-19 was much higher than the death rate of 1.4%-3.2% in the general Wuhan population with COVID-19[6]. These striking 3 to 7 fold differences in death rates and failure to survive severe complications with 62% (8/13) dying once they developed severe complications suggest that these SCZ patients may be more vulnerable to more direct progression from severe complications to death from COVID-19 and overall less responsive to attempts at treating this infection. A large number of epidemiological studies have shown that high rates of smoking[14-16], obesity[17-18], diabetes[19-20], and cardiovascular diseases[21] occur in SCZ patients, especially in those chronic and medicated patients, and that these comorbid disorders may contribute to a 15%-20% reduction in life expectancy reported in this population[15-21]. Therefore, the chronic SCZ patients in this study may have been vulnerable to higher mortality from COVID-19 based primarily on these other illnesses.

Another remarkable feature in our patients with COVID-19 is the relatively low contagion rate, in spite of almost all patients having clear and repeated contacts with infected patients before these infected patients showed clinical symptoms. We did not test for COVID-19 in all 504 patients so we do not know the actual rate of infection in this group, but relatively few (17%) showed any signs of COVID-19. This low disease rate was remarkable in spite of obvious potential for human-to-human transmission in the hospital with its densely populated wards that had 4-6 people in one room. COVID-19 may be spread through the respiratory or gastrointestinal tract, but gastrointestinal tract symptoms, such as nausea, vomiting, or diarrhea were uncommon in these patients, making upper respiratory tract contagion most likely.

While the most common symptom of fever in 82% of our CP patients was consistent with the 89% community rate, cough frequency (31%), which was much less than the community rate of 68%, might have contributed to the relatively lower contagion rate in these hospitalized patients[1-6]. Moreover, the cough frequency may have been low because of the sedative influence of antipsychotic medication. Additionally, fewer of our patients had gastrointestinal symptoms like nausea or vomiting (5%) and diarrhea (4%) than found in the community[6]. Reasons for these symptom differences may include biological differences in the disease of SCZ and specific medication effects. For example, antipsychotic agents can reduce nausea, vomiting, and diarrhea[22], masking these symptoms in COVID-19, and we found a specific effect of clozapine in reducing risk of COVID-19 induced symptoms and possibly infection itself. From another perspective, we found that nearly half of our patients with COVID-19 exhibited reduced white cell counts, including 46% with lymphocytopenia, 36% with leuko-

Table 2 Characteristics of schizophrenia patients with or without coronavirus disease 2019

	COVID-19 patients (n = 84)	Non-COVID-19 patients (n = 174)	F, Z or χ^2	P
Age (yr)	54.6 ± 9.5	51.1 ± 9.5	7.65	0.006
Gender (Male/ Female)	64/20 (76.2%/23.8%)	137/31 (78.7%/17.8%)	3.36	0.07
Marital status			1.06	0.59
Single	45/75 (60.0%)	104/160 (65.0%)		
Married	9/75 (12.0%)	21/160 (13.1%)		
Divorced	21/75 (28.0%)	35/160 (21.9%)		
Weight (kg)	62.0 ± 10.3	67.8 ± 16.6	9.40	0.002
Blood pressure				
Systolic pressure	122.5 ± 7.2	125.5 ± 8.0	7.98	0.005
Diastolic pressure	77.3 ± 5.7	76.6 ± 6.0	0.81	0.37
Smoker/non-smoker	11/65	92/74	35.8	0.000
Duration of illness (years)	29.4 ± 11.0	27.4 ± 10.3	2.09	0.14
Age of onset (years)	25.4 ± 7.9	23.8 ± 7.3	2.06	0.15
Comorbid physical diseases	43 (48.8%)	44/164 (26.8%)	11.9	0.001
Antipsychotics			14.1	0.03
Olanzapine	18 (21.4%)	16 (9.2%)		
Risperidone	16 (19.0%)	45 (25.9%)		
Clozapine	15 (17.9%)	55 (31.6%)		
Quetiapine	13 (15.5%)	18 (10.3%)		
Aripiprazole	11 (13.1%)	17 (9.8%)		
Ziprasidone	4 (4.8%)	5 (2.9%)		
Typicals	7 (8.3%)	18 (10.3%)		
Antipsychotic dose (mg/d) (chlorpromazine equivalents)	264.4 ± 160.8	226.9 ± 152.8	3.16	0.08

COVID-19: Coronavirus disease 2019.

penia, and 34% with neutropenia, and 12% had thrombocytopenia and 68% had elevated C-reactive protein levels. While these findings are consistent with community patient reductions during COVID-19[1,3,6], antipsychotic drugs, especially clozapine, also are associated with low blood cell counts[23-25]. Therefore, protective effects of clozapine in our patients remain interesting, but in need of replication, while adverse factors in our SCZ patients, such as physical diseases, older age, and lower weight (caused by malnutrition), clearly appear to be risk factors for COVID-19 and its severe complications including death.

The three protective clinical factors of clozapine treatment, smoking, and being male have remarkable associations with COVID-19 among our SCZ inpatients. Moreover, the logistic analysis found significant independent contributions from these three factors for developing COVID-19 symptoms and complications. Biological mechanisms that might contribute to clozapine's association are its anti-inflammatory effects by inhibiting a NOD-like receptor family and the pyrin domain-containing protein-3 inflammasome[26]. Immunosuppression and anti-inflammatory effects of nicotine and smoking may also be a mechanism for the protective effects of smoking on COVID-19. We previously found that SCZ smokers had significantly decreased IL-2 and IL-6 levels, supporting that nicotine may cause immunosuppression in SCZ patients[27].

The association between smoking and COVID-19 has become a controversial topic in the world [28-29]. It is well known that smoking is harmful to health, and COVID-19 is just another example of how smoking may cause lung damage and makes a person at higher risk for COVID-19 and its complications. However, the most recent epidemiological survey demonstrates that current smoking status may protect against COVID-19[30], which may be based on the molecular biology of nicotinic receptor[31]. A recent

hypothesis has proposed that the nicotinic acetylcholine receptor may play a pivotal role in the pathophysiology of COVID-19, and nicotine and nicotinic agents may be a possible treatment for COVID-19[30]. Thus, our finding that smoking had a protective effect on COVID-19 among the SCZ inpatients appears to provide the new clinical support for this hypothesis. However, due to the limited sample size in this study, our finding should be replicated in a larger sample of smoking SCZ patients in further investigation. In addition, angiotensin-converting enzyme-2 (ACE2) receptor is a novel adhesion molecule through which SARS-CoV-2 can invade target cells causing COVID-19[32,33]. Interestingly, some recent studies found a connection between smoking and COVID-19[34]. Moreover, smokers had higher ACE2 gene expression than never-smokers, while nicotine may up-regulate ACE2 receptors, suggesting that smokers may be more susceptible to COVID-19, and smoking may exacerbates mortality[35]. Taken together, the relationship between smoking and COVID-19 is still contradictory, which deserves further study.

Our study has some limitations. First, a few cases had missing or incomplete symptom data due to the urgent situation in providing treatments. Second, about one-third of patients did not have COVID-19 laboratory tests to confirm their diagnosis due to restrictions in testing availability. Third, due to the much older age of the SCZ patients with COVID-19, some had unavoidable recall problems with some clinical data. Fourth, since many patients were still in the hospital when we extracted the data, and the outcome was unknown at the time of data cutoff, we were only able to use data about their clinical outcome at the time of data analysis. More patients may have died, for example, beyond the window of this study timeframe, and we did not have data on the prevalence of asymptomatic COVID-19 within this inpatient population to enable an accurate assessment of contagion among these inpatients. Fifth, there is a lack of the data on the possible change of mental clinical state in the infected patients. Hence, we did not know whether there was any change in their symptoms of SCZ at the time of their infection.

CONCLUSION

In summary, we have found a seemingly higher prevalence of COVID-19 among the SCZ inpatients than that in the general population in Wuhan. Moreover, the 9.5% mortality of these patients with CP is remarkably higher than that in the general population from this region. These findings suggest that these primarily SCZ patients may be more vulnerable to death from severe complications of COVID-19 and need rapid and intensive interventions once clinicians detect COVID-19. While some symptoms like fever occurred at similar rates in our patients and in the community, other symptoms like cough and gastrointestinal symptoms were less common, and other symptoms, such as poor appetite and fatigue, were substantially more common in our SCZ patients. Less coughing may have reduced contagion and lack of vomiting and diarrhea may have limited fecal spread. Finally, our SCZ patients with COVID-19 had several high risk factors. These infected patients were older, had lower weight and more comorbid physical diseases, and unexpectedly, had a less smoking rate and less treatment with clozapine. It appears that clozapine treatment and smoking may be protective for COVID-19 among SCZ inpatients, perhaps related to nicotine and clozapine immunosuppression, which deserves further exploration.

ARTICLE HIGHLIGHTS

Research background

In contrast to many Western countries, China has maintained its large psychiatric hospitals. The prevalence and clinical characteristics of coronavirus disease 2019 (COVID-19) in inpatients with schizophrenia (SCZ) are unclear.

Research motivation

In the large mental health hospitals in China, the resources for managing this COVID-19 epidemic are very limited, and these SCZ inpatients are expected to be highly contagious.

Research objectives

To assess the prevalence of COVID-19 among inpatients with SCZ and compare the infected to uninfected SCZ patients in a Wuhan psychiatric hospital.

Research methods

We retrospectively collected demographic characteristics and clinical profiles of all SCZ patients with COVID-19 at Wuhan's Youfu Hospital.

Research results

Among the 504 SCZ patients, 84 had COVID-19, and we randomly sampled 174 who were uninfected as a comparison group. The overall prevalence of COVID-19 in SCZ inpatients was 16.7%. Among these 84 SCZ patients with confirmed COVID-19, the median age was 54 years and 76.2% were male. The most common symptom was fever (82%), and less common symptoms were cough (31%), poor appetite (20%), and fatigue (16%). Compared with SCZ patients without COVID-19, patients with COVID-19 were older ($P = 0.006$), significantly lighter ($P = 0.002$), and had more comorbid physical diseases ($P = 0.001$). Surprisingly, those infected were less likely to be smokers (< 0.001) or to be treated with clozapine ($P = 0.03$). Further logistic regression showed that smoking [odds ratio (OR) = 5.61], clozapine treated (OR = 2.95), and male (OR = 3.48) patients with relatively fewer comorbid physical diseases (OR = 0.098) were at lower risk of COVID-19. The SCZ patients with COVID-19 presented primarily with fever, but only one-third had a cough, which might otherwise be the most common mode of transmission between individuals.

Research conclusions

Two unexpected protective factors for COVID-19 among these SCZ inpatients are smoking and clozapine treatment.

Research perspectives

Clozapine treatment and smoking may be protective for COVID-19 among SCZ inpatients, perhaps related to nicotine and clozapine immunosuppression, which deserves further exploration.

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