Correlation Between People with Schizophrenia and COVID-19 Based on Demographic Characteristics

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Abstract. Background: In Indonesia, Coronavirus Disease (COVID-19) was first reported on March 2, 2020, about 4 months after the first case was reported in China. Subsequently, 2 cases were initially reported, and on the 6th of March same year, additional 2 were also reported, leading to an increase in the rising number of cases in the world. The pandemic is affecting mental health in the general population, specifically patients with mental disorders. Therefore, this study aims to determine the correlation between PWS and COVID-19 based on demographic characteristics. **Method:** This study is a cross sectional correlative study. The sample was obtained using a non-probability sampling technique of consecutive sampling type in which 2 correlation variables are evaluated, and there were 48 PWS and 48 controls. This study was conducted at the Mental Hospital Prof. M. Ildrem, North Sumatra Province.

Result: The results showed that there was a correlation between PWS and COVID-19 PANSS as well as COVID-19 scores with a value of $r = 0.519$. Additionally, there was also a correlation between years of education, employment status, and income between PWS and Controls.

Conclusion: There was a relationship between the PANSS PWS score and COVID- 19, thereby indicating the relationship between schizophrenia and COVID-19

Keyword: Schizophrenia · COVID-19 · Demographics · PWS · Control

Abbreviation

PWS (People with schizophrenia)

1 Introduction

In Indonesia, Coronavirus Disease-19 (COVID-19) was first reported on March 2, 2020, about 4 months after the first case was reported in China. There were 743,196 confirmed cases as of December 31, 2020, 22,138 died, and 611,097 recovered [1]. After SARS-CoV and the Middle East Respiratory Syndrome coronavirus (MERS-CoV), the

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appearance of COVID-19 has been noted as the third introduction of highly pathogenic coronaviruses into the human population in the 21st century [2]. This pandemic is spreading rapidly both nationally and internationally. The World Health Organization considered it an emergency within a month, and in March 2020, the disease has been declared as a pandemic [3, 4].

Non-communicable conditions like mental illnesses and cardiac problems are becoming more susceptible to infectious infections and malnutrition in underdeveloped nations, where these conditions can be fatal [5]. A study on the pandemic's warning signs found that those with mental problems in particular may be affected, as well as the general population's mental health [6]. Subsequently, stress can be triggered by COVID-19 and poor public health measures, which may worsen mental health, it is suspected that the impact may be higher in PWS. These infections worsen PWS symptoms because coronavirus is linked to psychotic symptoms through immunological processes [7].

Neuroimmune networks play a role in the link between COVID-19 infection and mental health, according to the mechanism. Numerous psychiatric diseases are associated with elevated cytokine levels, and the immunological markers resemble those of COVID-19 infection. Monoamines including dopamine, norepinephrine, and serotonin are among the neurotransmitters that are affected by cytokines that enter the brain or the severity of their corresponding local alterations. Schizophrenia is one of many mental illnesses whose pathogenesis is thought to involve changes in neurotransmitter metabolism. The immune system is seen as a link between SARS- CoV or SARS-CoV-2 infection and mental health disorders because changes in cytokine levels lead to disruptions in neurotransmitter metabolism and precipitate behavioral impairments [8]. The government outlawed and enforced limits to lessen physical closeness in an effort to stop the virus' spread. Its adoption has a disastrous effect on PWS as well [9].

A retrospective study was conducted in Israel in 2021 by Dana Tzur Bitan and colleagues to ascertain the morbidity and mortality rates of PWS due to COVID-19. They compared secondary data from PWS and controls from secondary data from Clalit Health Organization (CHS), Israel's largest operating healthcare organization. It was reported that PWS were less likely to test positive for COVID-19 but were 3 times more likely to die from the virus [10]. The same study was conducted by Wang and colleagues in 2020 using secondary data from 360 hospitals and 317,000 providers, moreover, 50 states in the United States reported that PWS are more at risk of experiencing COVID-19 infection. They also reported that female PWS are more at risk [11]. Therefore, this study examines the impact of COVID-19 on schizophrenia, and then demographic characteristics are needed for proper management of PWS.

2 Method

2.1 Study Design

This is a one-time correlative analytical cross-sectional study, which assesses the correlation between PWS and COVID-19 [12]. The study took place between August-December 2021 in the Emergency Installation (IGD) Regional Unit Service Agency (BLUD) Mental Hospital of North Sumatra Province (RSJ. Provsu), Prof. Dr. M. Ildrem [13].

2.2 Population

The sampling was carried out using a non-probability sampling technique with a consecutive sampling type in which all participants who came and met the inclusion criteria: a) had a history of previous psychiatric disorders, b) had a family history of psychiatric disorders, c) had a history of neurological diseases, endocrine disorders and autoimmune diseases, and d) had a history of alcohol intake and other addictive substances [14]. The sample size was 48 PWS (18 women and 30 men) and 48 control groups (18 women and 30 men).

2.3 Data Analysis

Two types of corelative analysis were carried out in this study. Categorical data was correlatively assessed by using Contingency Coefficient test, while categorical- numerical correlative analysis was done by using Eta Correlation test [12]. Data processing and analysis were carried out with the help of the Statistical Package for Social Sciences (SPSS) software [13].

2.4 Results

The results showed that most of the gender of PWS were male, namely 30 participants (62.5%) while most of the control were male, namely 30 participants (62.5%). The most variable of PWS work status was unemployed, namely 40 participants (83.3%), and the most control work status was employed, namely 42 participants (87.5%). The most positive COVID-19 variables in PWS were 34 participants (70.8%), and the most negative COVID-19 variables in controls were 36 participants (75%). The median age and length of education for PWS were 25 years and 9, while for the control group were 28.50 and 20, respectively. The median monthly income for PWS was IDR 2.67 million, and the control group was IDR 7.40 million. The median PANSS score was 105 (Table 1).

The length of PWS education has a numerical scale and the COVID-19 variable has a nominal scale, therefore the eta correlation test was used. There was no correlation between the length of education of PWS and COVID-19, as shown by the value of $r = 0.226$, and there was also no correlation between the length of education of the control group and COVID-19 with a value of $r = 0.230$ (Table 2).

There was no correlation between the work status of PWS and COVID-19 as well as the work status of the control group and COVID-19 with a value of $r= 0.190$ and a value of $p= 0.181$ for PWS and a value of $r= 0.073$ and a value of $p= 0.614$ for the control group (Table 3). In monthly income, there was no correlation between PWS and COVID-19 and the control group with COVID-19 with a value of $r= 0.222$ for PWS and $r= 0.229$ (Table 4) in the control group using the eta test.

There was a relationship between the PANSS score and COVID-19, and a value of $r = 0.519$ was obtained (Table 5).

Table 1. Demographic overview of PWS and control*

Demographic characteristics	PWS (n = 48)	Control (n = 48)
Age	25 (18-41)	28,50 (25 - 38)
Gender		
- Male	30 (62,5)	30 (62,5)
- Female	18 (37,5)	18 (37,5)
Length of education	9 (6-15)	20 (18-24)
Employment		
- Yes	8 (16,7)	42 (87,5)
- No	40 (83,3)	6 (12,5)
Monthly income*	2,67 (2-5)	7,40 (4-8)
PANSS score	105 (80-120)	-
COVID-19 Status		
- Positive	34 (70,8)	12 (25)
- Negative	14 (29,2)	36 (75)

*Numerical data are not normally distributed, thus median (min-max) was used to present the data. Categorical data are presented in frequency n (%).**Presented in million IDR

Table 2. Correlation of length of education on PWS and controls with COVID-19

Variable	PWS Length of education	r*	Control Length of education	r*
	9 (6-15)	0.226	20 (18-24)	0.230
- COVID-19 Positive	34		12	
- COVID-19 Negative	14		36	

*Eta correlation test

Table 3. Correlation of employment status on PWS and control with COVID-19

Variable	PWS Employmet		r*	p	Control Employment		r*	p
	Yes	No			Yes	No		
- COVID-19 Positive	8	26	0.190	0.181	10	2	0.073	0.614
- COVID-19 Negative	6	8			32	4		

*Contigency coefficient test

Table 4. Correlation of monthly income on PWS and control with COVID-19

Variable	PWS monthly income	Control monthly income	r*
	2.67 (2-5)	7.40 (4-8)	0.229
- COVID -19 Positive	34	12	
- COVID-19 Negative	14	36	

*eta correlation test

Table 5. Correlation of PWS and COVID.19 PANSS scores

Variable	PANSS Score	r*	Fcount	Ftable
- COVID -19 Positive	34	0.519	16.92	4.05
- COVID-19 Negative	14			

*eta correlation test

3 Discussion

In this study, there was no relationship between PWS and controls with COVID-19, in contrast to the study conducted by Barr and colleagues in 2021 by analyzing secondary data from the US BioBank which reported that 6 patients suffering from mental disorders, including schizophrenia, were more at risk for PWS [15]. Furthermore, there was no relationship between work status and monthly income between PWS and controls with COVID-19, which in the United States proposed avolition as a fundamental sign of negative symptoms of schizophrenia. Despite varying degrees, all PWS have negative symptoms. This avolition explains why many PWS do not go to school, study, work, and participate in other social activities. Unemployment or working from home can reduce contact with many people, physical distancing can as well reduce the risk of being infected. The study conducted by Barr and colleagues in 2021 through analyzing secondary data from the US BioBank reported that 6 patients suffering from mental disorders including schizophrenia were more at risk for PWS with low economic status and those without health insurance were at higher risk [15, 16].

In this study, the PANSS score showed that there was a correlation between PWS and COVID-19. This is in line with the study conducted in Indonesia by Putri et al, in 2019, which reported that there was a significant correlation between the positive symptom, PANSS score, and instrumental activities of daily living among male PWS between 24–45 years [17]. High PANSS scores related to immune dysfunction and inflammation implicated in the pathogenesis of schizophrenia by many epidemiological and clinical studies. In particular, PWS showed increased levels of pro-inflammatory cytokines, and the vulnerability-stress model of inflammation also supports the role of inflammation in schizophrenia.

4 Conclusion

In this study, there was a relationship between PWS PANSS scores and COVID-19, thereby indicating a relationship between schizophrenia and COVID-19.

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