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# The Relationship Between Age, Sex, and Comorbidities with the Degree of Coronavirus Disease 2019 (Covid-19) in Children at the Hajj Adam Malik Central General Hospital in Medan

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**KEYWORDS**
COVID-19, pediatric patients, comorbidities, severity, hospital analysis.

**ABSTRACT**
Coronavirus Disease 2019 (COVID-19) has significantly impacted various age groups, including children. The severity of COVID-19 in pediatric patients is influenced by multiple factors, such as age, gender, and the presence of comorbidities. This study analyzes the relationship between these factors and the severity of COVID-19 in children at the Haji Adam Malik Central General Hospital Medan. Using a cross-sectional analytical observational design with a retrospective approach, the study utilizes secondary data from patient medical records to assess demographic characteristics, comorbidities, and the severity of COVID-19 in pediatric cases. The research was conducted from March 2024 to July 2024, focusing on pediatric patients diagnosed with COVID-19 during the study period. The results show that there is no significant relationship between age and sex with the severity of the disease. However, comorbidities such as heart and blood vessel disorders, gastrointestinal and urinary tract diseases, and nervous system disorders were found to significantly influence the severity of COVID-19, with children having these comorbidities experiencing higher severity and mortality rates. The study emphasizes the importance of understanding the relationship between comorbidities and the severity of COVID-19 in children, offering valuable insights for healthcare providers in improving management and treatment strategies for pediatric COVID-19 patients.

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## INTRODUCTION

Coronavirus Disease 2019 (*Covid-19*) is a disease caused by infection with *Severe Acute Respiratory Syndrome Coronavirus-2* (*SARS-CoV-2*), which belongs to the *Betacoronavirus* of the *Coronaviridae* family. *Coronavirus Disease 2019* (*COVID-19*) was first discovered in late December 2019 in the Chinese city of Wuhan, which was originally named *Wuhan pneumonia*. This COVID-19 infection is caused by *SARS-CoV-2*, and spread rapidly around the world until finally the World Health Organization (WHO) called the disease related to 2019-nCoV as COVID-19 (Ai et al., 2020; Felicia, 2020). The first COVID-19 case was found in Indonesia on March 2, 2020, and as of April 2022, there have been more than 6 million confirmed positive cases with a total death toll of more than 150,000. During this period, there have been three waves of COVID-19 cases, the last of which occurred from January to April 2022 (Martin et al., 2022). Since January 2022, *SARS-CoV-2* has caused more than 5.4 million deaths worldwide (Hu et al., 2021). In Indonesia, the incidence is higher than in other Southeast Asian countries since December 2021, at 3.38% (Sari & Butar-Butar, 2022).

A case of COVID-19 in children was first reported in Shenzhen in January 2020. COVID-19 cases in Indonesia reached 1,398,578 confirmed cases as of January 26, 2021, with 37,932 deaths (Cucinotta & Vanelli, 2020). Indonesia has the second highest number of deaths in Southeast Asia. In an epidemiological study, more than 300 children in Indonesia who were suspected of being infected with COVID-19 have died, with a Case Fatality Rate (CFR) of 1.1% (Pulungan, 2020). When compared to other countries most affected, the proportion of COVID-19 cases in children in the United States (US) is overall similar to that of Indonesia (9% in the US and 9.1% in Indonesia), but there is a difference: the CFR in the US is 0–0.6% (Pulungan, 2020; American Academy of Pediatrics and Children's Hospital Association, 2020). Based on research from January 1 to October 5, 2020, 275,661 children without comorbidities and 9,353 children with comorbidities were affected by COVID-19. Among severe cases, 5.1% were children with comorbidities, and 0.2% were without comorbidities. Children with comorbidities have a severe risk of COVID-19 and may face higher mortality than children without comorbidities. Specifically, the proportion of severe and critical cases by age group was 10.6% for <1 year old, 7.3% for 1–5 years old, 4.2% for 6–10 years old, 4.1% for 11–15 years old, and 3.0% for ≥16 years (Wang et al., 2020; Henry et al., 2020).

Another condition that can cause the severity of COVID-19 in children is the presence of pre-existing comorbidities (Lu et al., 2020; Wang et al., 2020; Gotzinger et al., 2020; Shekerdemien et al., 2020; Hag et al., 2021; Prastyowati, 2020). Non-communicable diseases (NCDs) such as central nervous system diseases, heart, kidney, malignancy, immunodeficiency, and lung disease are comorbidities that can increase the severity and cause death in children infected with *SARS-CoV-2*.[11,17–22]

The population of children in Europe with comorbidities in the form of chronic lung disease (asthma, bronchopulmonary dysplasia), malignancies (leukemia, lymphoma, solid tumors), neurological disorders (epilepsy, cerebral palsy), congenital heart disease, chromosomal abnormalities, and chronic kidney failure are high-risk groups for severe and critical COVID-19 conditions that require Pediatric Intensive Care Unit (PICU) care (Lu et al., 2020; Graff et al., 2021; Swann et al., 2020; Muharramah & Prihartono, 2021; Negara et al., 2022; Shereen et al., 2020; Prastyowati, 2020).

Previous studies have examined the impact of comorbidities and demographic characteristics on the severity of COVID-19 in children, but many studies have focused primarily on the adult population or have not sufficiently explored the relationship between specific demographic factors and the degree of severity in pediatric cases. For instance, Dong et al. (2020) conducted a large-scale study examining COVID-19 severity in children, finding that age and pre-existing conditions like asthma and congenital heart disease significantly influenced the outcome. However, this study lacked a comprehensive analysis of the role of gender and the comparative severity in different age groups in more localized settings, such as hospitals in Southeast Asia. Additionally, Saraswati et al. (2021) studied the pediatric cases of COVID-19 in Indonesia, focusing primarily on overall case trends and outcomes, but did not analyze the correlation between comorbidities and the severity of the disease.

The purpose of this study is to analyze the relationship between age, sex, and comorbidities with the degree of COVID-19 in children at the Haji Adam Malik Central General Hospital Medan. The study aims to describe the demographic characteristics of COVID-19 degrees in children, determine the comorbidities associated with severity, analyze the relationship between age and severity, analyze the relationship between sex and severity, and analyze the relationship between comorbidities and the degree of COVID-19 in children.

The benefits of the study are to increase researchers' knowledge about the relationship between age, gender, and comorbidities with the degree of COVID-19 in children at the Haji Adam Malik

Central General Hospital Medan. This includes understanding the demographic characteristics and the proportion of the degree of childhood disease with the degree of COVID-19, which can provide an overview of the high rate of COVID-19 infection in children through education to the community. It is a contribution to science in assessing the relationship between age, sex, and comorbidities with the degree of COVID-19 in children at the Haji Adam Malik Central General Hospital in Medan and can serve as the basic data for further research.

## METHOD

This study employs a cross-sectional analytical observational design with a retrospective approach. The aim is to analyze the relationship between age, sex, comorbidities, and the degree of *COVID-19* in children at Haji Adam Malik Central General Hospital Medan. The research utilizes secondary data, specifically patient medical records, to assess the variables of interest. The study will examine the demographic characteristics, comorbid conditions, and severity of *COVID-19* in pediatric patients who were treated at the hospital. The data collection process will involve retrieving the relevant medical records from the hospital database for all pediatric patients diagnosed with *COVID-19* during the specified study period. The study will be conducted from March 2024 to July 2024, ensuring that the data collected reflects recent trends in *COVID-19* cases among children in Medan. The statistical analysis will be performed using appropriate tools to determine the relationship between the variables and the severity of *COVID-19* in this pediatric population.

## RESULTS AND DISCUSSION

### Demographic Characteristics of Research Subjects

This study was attended by as many as 247 COVID-19 pediatric patients who were treated at the Haji Adam Malik Central General Hospital in Medan starting from May 2020 to May 2023. All child subjects have met the inclusion and exclusion criteria.

Table 1 displays the demographic characteristics of pediatric patients with Covid 19 who are treated at the Haji Adam Malik Central General Hospital Medan.

**Table 1. Characteristics of Pediatric Patients with Covid 19 Treated at Haji Adam Malik Hospital Medan**

| Characteristics of the Research Subject | n = 247 |
|---|---|
| Time of Event, n (%) | |
| 2020 – 2021 | 118 (47,8) |
| 2022 – 2023 | 129 (52,2) |
| Gender, n (%) | |
| Man | 129 (52,2) |
| Woman | 118 (47,8) |
| Age, n (%) | |
| > 28 days - < 10 years | 153 (61,9) |
| > 10 – 18 years old | 94 (38,1) |
| Status Gizi, n (%) | |
| Obesity | 22 (8,9) |
| More Nutrition | 19 (7,7) |
| Normal Nutrition | 108 (43,7) |
| Undernutrition | 60 (24,3) |
| Malnutrition | 38 (15,4) |
| Covid 19 Severity, n (%) | |
| Heavy | 84 (34) |
| No Weight | 163 (66) |
| Outcome, n (%) | |

| Characteristics of the Research Subject | n = 247 |
|---|---|
| Die | 33 (13,4) |
| Recover | 200 (81) |
| PAPS | 14 (5,7) |

Most of the children with COVID-19 were treated during 2022-2023, which was 129 people (52.2%). There were 129 male subjects (52.2%) with the highest age > 28 days - < 10 years as many as 153 people (61.9%). Most of the subjects had normal nutrition as many as 108 people (43.7%). Based on the degree of severity, as many as 84 people (34%) showed a degree of severity. The number of children who died amounted to 33 people (13.4%).

**Distribution of Comorbidities in Pediatric Patients with Covid 19 Treated at Haji Adam Malik Hospital Medan**

Table 2 displays the characteristics of comorbidities in children with Covid 19 who are treated at Haji Adam Malik Hospital Medan.

**Table 2. Distribution of Comorbidities in Pediatric Patients with Covid 19 Treated at Haji Adam Malik Hospital Medan**

| Comorbid | n = 247 |
|---|---|
| Respiratory Tract, n (%) | |
| Dust Pleurra | 2 (0,8) |
| Asthma | 1 (0,4) |
| TB Published | 3 (1,2) |
| None | 241 (97,6) |
| Cardiovascular, n (%) | |
| PJB | 31 (12,6) |
| None | 216 (87,4) |
| Kidneys and urinary tract, n (%) | |
| ISK | 3 (1,2) |
| Acute kidney failure | 5 (2) |
| Chronic kidney failure | 7 (2,8) |
| Syndrome nefrotik | 1 (0,4) |
| None | 231 (93,5) |
| Nervous system, n (%) | |
| Epilepsy | 7 (2,8) |
| Encephalitis | 2 (0,8) |
| Meningitis | 2 (0,8) |
| CP | 2 (0,8) |
| Hydrocephalus and cerebral edema | 4 (1,6) |
| Post VP shunt | 2 (0,8) |
| None | 228 (92,3) |
| Gastrointestinal tract, n (%) | |
| Post laparotomi eppendictomy | 5 (2) |
| Cholecysitis | 2 (0,8) |
| None | 240 (97,2) |
| Violence, n (%) | |
| ALL | 5 (2) |
| AML | 3 (1,2) |
| Tumor abdomen | 1 (0,4) |
| Osteosarcoma | 1 (0,4) |
| None | 237 (96) |
| Diabetic ketoacidosis, n (%) | 10 (4) |

| **Comorbid** | **n = 247** |
|---|---|
| SLE, n (%) | 2 (0,8) |
| Electrical burn, n (%) | 1 (0,4) |

In the respiratory tract, the most common disease was pulmonary TB in 3 people (1.2%), followed by pleural effusion in 2 people (0.8%). In the heart and blood vessels, there are 32 children (13%) with congenital heart disease. In the kidneys and urinary tract, there were 7 children (2.8%) with chronic kidney failure. In the nervous system, there are 7 children (2.8%) with epilepsy. The most disturbance in the gastrointestinal tract was post laparotomy appendectomy for 5 people (2%).

There were 108 children with malnutrition (43.7%), Acute Lymphocytic Leukemia as many as 5 people (2%), diabetic ketoacidosis as many as 2 people (0.8%), SLE as many as 2 people (0.8%) and electrical burn as many as 1 person (0.4%).

**Relationship between Gender, Age, Malnutrition and Comorbidities with the Severity of Covid 19 in Pediatric Patients with Covid 19 Treated at Haji Adam Malik Hospital Medan**

Table 3 displays the results of the analysis of the relationship between age, malnutrition and comorbidities with the severity of Covid 19 infection in children treated at Haji Adam Malik Hospital Medan.

**Table 3. Relationship between Gender, Age, Malnutrition and Comorbidities with the Severity of Covid 19 in Pediatric Patients with Covid 19 Treated at Haji Adam Malik Hospital Medan**

| **Demographic Characteristics** | **Severity of Covid 19** | | **p** |
|---|---|---|---|
| | **Heavy** | **No Weight** | |
| Time of Event, n (%) | | | |
| 2020 – 2021 | 36 (30,5) | 82 (69,5) | 0,325a |
| 2022 – 2023 | 47 (36,4) | 82 (63,6) | |
| Gender, n (%) | | | |
| Man | 40 (31) | 89 (69) | 0,367a |
| Woman | 43 (36,4) | 75 (63,6) | |
| Age, n (%) | | | |
| > 28 days - < 10 years | 49 (32) | 104 (68) | 0,503a |
| > 10 – 18 years old | 34 (36,2) | 60 (63,8) | |
| Malnurition, n (%) | | | |
| Already | 48 (34,5) | 91 (65,5) | 0,726a |
| No | 35 (32,4) | 73 (67,9) | |
| Comorbid | | | |
| Airways, n (%) | | | |
| Ada | 4 (66,7) | 2 (33,3) | 0,100b |
| None | 79 (32,8) | 162 (67,2) | |
| Heart and blood vessels, n (%) | | | |
| Ada | 21 (67,7) | 10 (32,3) | <0,001a |
| None | 62 (28,7) | 154 (71,3) | |
| Kidneys and urinary tract, n (%) | | | |
| Ada | 13 (81,2) | 3 (18,8) | <0,001a |
| None | 70 (30,3) | 161 (69,7) | |
| Nervous system, n (%) | | | |
| Ada | 9 (47,4) | 10 (52,6) | 0,186a |
| None | 74 (32,5) | 154 (67,5) | |
| Gastrointestinal tract, n (%) | | | |
| Ada | 0 | 7 (100) | 0,099b |
| None | 83 (34,6) | 157 (65,4) | |

| | | | |
|---|---|---|---|
| Violence, n (%) | | | |
| Ada | 4 (40) | 6 (60) | 0,736b |
| None | 79 (33,3) | 158 (66,7) | |
| Diabetic ketoacidosis, n (%) | | | |
| Ada | 2 (40) | 0 (60) | 0,122b |
| None | 81 (33,1) | 164 (66,7) | |
| Electrical burn, n (%) | | | |
| Ada | 1 (100) | 0 | 0,336b |
| None | 82 (33,3) | 164 (66,9) | |
| SLE, n (%) | | | |
| Ada | 2 (100) | 0 | 0,122b |
| None | 81 (33,1) | 164 (66,9) | |

aChi Square, bFischer's Exact

Based on the time of infection, in 2020-2021 out of 118 infected children, there were 36 children (30.5%) with severe degrees. Of the 129 children infected in 2022-2023, there are 47 children (36.4%) with severe degrees. Using the Chi Square test, it was shown that there was no significant relationship between the time of infection and the degree of covid 19 (p=0.325).

Of the 129 boys, there were 40 people (31%) with severe Covid 19. Meanwhile, out of 118 girls, there were 43 people (36.2%) with severe Covid 19. Using the Chi square test, it was shown that there was no significant relationship between sex and the severity of Covid 19 (p=0.367).

Based on age, of the 153 children aged >28 days - < 10 years, there were 49 people (32%) with severe degrees. Of the 94 children aged 10 - 18 years, there were 34 people (36.2%) with severe degrees. Using the Chi Square test, it was shown that there was no significant relationship between age and the degree of Covid 19 (p=0.503).

Of the 139 children with malnutrition, there are 48 people (34.5%) with severe Covid 19. Meanwhile, of the 108 children who were not malnourished, there were 35 people (32.4%) with severe Covid 19. Using the Chi square test, it was shown that no significant association was found between malnutrition and the severity of Covid 19 (p=0.726).

Of the 6 children with respiratory tract disorders, there are 4 people (66.7%) with severe Covid 19. Meanwhile, of the 241 children who did not experience respiratory tract disorders, there were 79 people (32.8%) with severe Covid 19. Using the Chi square test, it was shown that no significant association was found between airway disorders and the severity of Covid 19 (p=0.100).

Of the 31 children with heart and blood vessel disorders, 21 people (67.7%) had severe Covid 19. Meanwhile, of the 226 children who did not have heart and blood vessel problems, there were 62 people (28.7%) with severe Covid 19. Using the Chi square test, it was found that a significant relationship was found between heart and blood vessel disorders and the severity of Covid 19 (p<0.001).

There were 16 children with kidney and urinary tract disorders as many as 13 people (81.2%) with severe Covid 19. Meanwhile, of the 231 children who did not have kidney and urinary tract disorders, there were 70 people (30.3%) with severe Covid 19. Using the Chi square test, it was shown that a significant relationship was found between kidney and urinary tract disorders and the severity of Covid 19 (p<0.001).

Of the 19 children with nervous system disorders, there were 9 people (47.4%) with severe Covid 19. Meanwhile, of the 224 children who did not experience nervous system disorders, there were 74 people (32.5%) with severe Covid 19. Using the Chi square test, it was shown that no significant association was found between nervous system disorders and the severity of Covid 19 (p=0.186).

Of the 7 children with gastrointestinal disorders, there were no children with severe Covid 19. Meanwhile, of the 238 children who did not experience gastrointestinal disorders, there were 83 people (34.6%) with severe Covid 19. Using Fischer's Exact test, it was shown that no significant association was found between gastrointestinal disorders and the severity of Covid 19 (p=0.099).

Of the 10 children with malignancy, there are 4 people (40%) with severe Covid 19. Meanwhile, of the 237 children who did not experience malignancy, there were 79 people (33.3%) with severe Covid 19. Using Fischer's Exact test, it was shown that no significant relationship was found between malignancy and severity of Covid 19 (p=0.736).

Of the 2 children with diabetic ketoacidosis, all of them have severe Covid 19. Meanwhile, of the 245 children who did not experience diabetic ketoacidosis, there were 81 people (33.1%) with severe Covid 19. Using Fischer's Exact test, it was shown that no significant association was found between SLE and the severity of Covid 19 (p=0.122).

Of the 1 children with electrical burns, it showed that Covid 19 was severe. Meanwhile, of the 246 children who did not experience electrical burn, there were 82 people (33.3%) with severe Covid 19. Using Fischer's Exact test, it was shown that no significant relationship was found between electrical burn and the severity of Covid 19 (p=0.336).

Of the 2 children with SLE, all of them have severe Covid 19. Meanwhile, of the 245 children who did not experience SLE, there were 81 people (33.1%) with severe Covid 19. Using Fischer's Exact test, it was shown that no significant association was found between SLE and the severity of Covid 19 (p=0.122).

**Multivariate Analysis of Factors Affecting the Severity of Covid 19**

The multivariate analysis used in this study aims to find out which independent variables have the most dominant influence in predicting the severity of Covid 19. In addition, it is also to obtain a formula for calculating the probability of the severity of Covid 19 from significant independent variables from the results of multivariate analysis.

The type of multivariate analysis used is multiple logistic regression because the dependent variables in this study are categorical. The variables included in the multivariate analysis were independent variables that had a p value < 0.25 from the results of the bivariate analysis. The eligible independent variables were disorders of the airways, disorders of the heart and blood vessels, disorders of the kidneys and urinary tract, disorders of the nervous system, disorders of the gastrointestinal tract, and SLE. The results of the multivariate analysis are presented in the following table 4.

**Table 4. Multivariate Analysis of Factors Affecting the Severity of Covid 19**

| Variable | B | p | Exp(B) | 95% CI for EXP(B) | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| Selection I | | | | | |
| Respiratory Tract | 2,101 | 0,079 | 8,172 | 0,786 | 84,953 |
| Heart and blood vessels | 1,937 | 0,000 | 6,940 | 2,986 | 16,130 |
| Kidneys and urinary tract | 2,749 | 0,000 | 15,632 | 4,230 | 57,764 |
| Nervous system | 1,065 | 0,036 | 2,900 | 1,072 | 7,843 |
| Gastrointestinal tract | -20,527 | 0,999 | 0,000 | 0,000 | , |
| SLE | 22,486 | 0,999 | 5.83E+10 | 0,000 | , |
| Constant | -1,283 | 0,000 | 0,277 | | |
| Selection II | | | | | |
| Respiratory Tract | 2,056 | 0,085 | 7,811 | 0,755 | 80,795 |
| Heart and blood vessels | 1,885 | 0,000 | 6,589 | 2,844 | 15,265 |
| Kidneys and urinary tract | 2,697 | 0,000 | 14,832 | 4,022 | 54,695 |

| Variable | B | p | Exp(B) | 95% CI for EXP(B) | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| Nervous system | 1,013 | 0,045 | 2,753 | 1,021 | 7,424 |
| Gastrointestinal tract | -20,558 | 0,999 | ,000 | 0,000 | , |
| Constant | -1,230 | 0,000 | ,292 | | |
| Selection III | | | | | |
| Respiratory Tract | 1,428 | 0,134 | 4,171 | 0,643 | 27,052 |
| Heart and blood vessels | 1,942 | 0,000 | 6,974 | 3,021 | 16,098 |
| Kidneys and urinary tract | 2,744 | 0,000 | 15,542 | 4,217 | 57,284 |
| Nervous system | 1,063 | 0,035 | 2,896 | 1,077 | 7,785 |
| Constant | -1,277 | 0,000 | 0,279 | | |
| Selection IV | | | | | |
| Heart and blood vessels | 1,955 | 7,064 | 3,084 | 16,176 | |
| Kidneys and urinary tract | 2,706 | 14,971 | 4,070 | 55,077 | |
| Nervous system | 1,049 | 2,856 | 1,076 | 7,581 | |
| Constant | -1,240 | 0,289 | | | |

By using the enter method, namely by removing one by one independent variables starting from the variable with the highest p > value of 0.05, it was obtained that there were three independent variables that significantly affected the severity of Covid 19 which was a comorbidity in this study, namely disorders of the heart and blood vessels, kidneys and urinary tract, and nervous system.

The most dominant variable affecting the severity of Covid 19 is kidney and urinary tract disorders with the largest Exp (B) value or value of 14.971 (95% IK = 4.070-55.077), meaning that child subjects with disorders in the kidneys and urinary tract will tend to be at risk of experiencing severe Covid 19 severity by 14.971 times greater than child subjects who do not have kidney and urinary tract disorders.

The second variable that affects the severity of Covid 19 is heart and blood vessel disorders with an OR value of 7.064 (95% IK = 3.084 – 16.176), meaning that child subjects with heart and blood vessel disorders will tend to be at risk of experiencing severe Covid 19 severity by 7.064 times greater than child subjects who do not have heart and blood vessel disorders.

The third variable that affects the severity of Covid 19 is a disorder in the nervous system with an OR value of 2.856 (95% IK = 1,076 – 7,581), meaning that child subjects with disorders in the nervous system will tend to be at risk of experiencing severe Covid 19 severity by 2.856 times greater than child subjects who do not experience disorders in the nervous system.

COVID-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) which causes a worldwide pandemic. One of the conditions that causes the severity of COVID-19 in children is the presence of pre-existing or comorbid diseases. This study involved 247 pediatric patients with COVID-19 who were treated at the Haji Adam Malik Central General Hospital in Medan from May 2020 to May 2023. All child subjects have met the inclusion and exclusion criteria. Based on the characteristics of pediatric patients with COVID-19 who were treated at the Haji Adam Malik Central General Hospital Medan, male patients (52.2%), this is in accordance with a meta-analysis study conducted by Ding Y et al which obtained the results of 58% of male patients and 42% of female patients with a value of (p = 0.401). This is also in accordance with a study conducted by Soebandrio A et al which obtained a ratio of women to men of 46.6% to 53.4%. While in the most comorbidities in women (63.6%), most previous epidemiological studies showed that men were dominant in the child age group (Korean Society of Infection Disease, 2020). However, according to the World Health Organization (WHO), children of all ages can be infected with COVID-19. Although children usually have a lower risk of exposure than adults. This difference can be due to the activity

related to the X gene namely IL-13, IL-4, IL-10, Xist, Tlr7, FoxP3 which modulates the innate and adaptive immune response to viral infections, in addition to hormonal and genetic factors can affect the expression of the ACE-2 receptor of SARS-CoV-2. Based on the research conducted by Dong et al, it can be concluded that there is no significant difference in the type gender (Dong et al., 2020).

In this study, based on comorbidities, the age group < 10 years old (32%), COVID-19 severe (34%). This is similar to a study conducted by Dong Y et al which found that the most Covid-19 patients were in the age group of 6-10 years, which was 24.5% compared to other age groups (Dong et al., 2020). A systematic review by Yasuhara J et al also found that from 114 patients, there were 61 patients (53.5%) aged 1-10 years, 24 patients (21%) over 10 years old and 29 patients (25.4%) under 1 year old.67 This is supported by previous research by Graff K et al who find that extreme age under 10 years is a risk factor for more severe Covid-19 cases (De Wilde et al., 2018).

In this study, the nutritional status was the most normal nutrition (43.7%). This is the same as a study conducted by Molla G et al which obtained from 49 child subjects with 76% normal weight, 90% normal height, 9% obesity and 3% malnutrition. The nutritional status itself is very important to pay attention to. Covid-19 has an impact on all population groups, and the severity is higher in those with low immunity and comorbidities such as diabetes, cardiovascular disease and obesity. Treatment for Covid-19 basically depends on the respective immune system. The immune system will protect the patient against pathogens such as viruses, bacteria and fungi. Many factors are effective in the development and protection of the body's immunity and one such factor is nutritional status (Xia et al., 2020). Based on previous research by She J et al, it was found that low age and a history of comorbidities are common risk factors for children with chronic lung disease, obesity, neurological diseases and developmental diseases (De Wilde et al., 2018).

In this study, the severity in children with Covid-19 was severe (34%). Meanwhile, in the Outcome of Recovery (81%). This is in accordance with the research conducted by Weldetsadik A et al which obtained the highest severity of mild degree which was 44 people (55.7%) followed by moderate degree as many as 15 people (19%), asymptomatic 13 people (16.5%), severe degree 5 patients (6.3%), and critical as many as 2 patients (2.5%) (Centers for Disease Control and Prevention, 2020). This can be caused by the immaturity of angiotensin converting enzyme (ACE) at a younger age. make children more protected from SARS-CoV2, as the virus uses ACE to enter type II pneumocytes in the lungs. Another theory says that in children who tend to experience many viral infections, repeated exposure to the virus can strengthen the immune system's response to SARS-CoV-2 (Zhu et al., 2020).

The multivariate analysis showed meaningful results, based on the regression equation above, the probability of a child with kidney and urinary tract disorders with an OR value of 14.971 (95% IK = 4.070-55.077) tends to be at risk of experiencing severe Covid 19 severity by 14.971 times more than those who do not have such disorders and heart and blood vessel disorders OR 7.064 (95% IK = 3.084 – 16.176) tends to be at risk of experiencing severe Covid 19 blood and nervous system OR 2.856 (95% IK = 1.076 – 7.581) means that children with disorders of the nervous system will tend to be at risk of experiencing severe Covid 19 severity by 2.856 times greater than child subjects who do not experience the disorder. There will be a chance of experiencing COVID-19 with a severe severity of 94%. This study has proven the hypothesis that there is a relationship between comorbidities and the severity of COVID-19 in children. Comorbidities with kidney and urinary tract disorders showed that children with kidney and urinary tract disorders would be 40.5 times more likely to have COVID-19 while children with respiratory disorders would be 16.2 times more likely to be at risk than children without respiratory and cardiovascular disorders. This is in line with a study conducted on 16 children with COVID-19 at Hasan Sadikin General Hospital stating that severe Acute Respiratory Syndrome Coronavirus-2 (SARS-

CoV-2) infection tends to affect the kidneys, which is manifested as a decrease in the glomerular filtration rate (GFR). Renal manifestations are life-threatening conditions such as end-stage renal disease (ESRD), especially when associated with viral infections. SARS-CoV-2 is a health problem that has emerged worldwide that has the potential to affect all organs including the kidneys (Zaki et al., 2012). In neurological disorders based on research This is in line with that conducted in Wuhan, China which included 214 cases showing that patients with SARS-CoV-2 infection generally have neurological symptoms with manifestations as acute cerebrovascular disease, impaired consciousness and skeletal muscle symptoms such as cerebral palsy, epilepsy, hydrocephalus, cerebral edema, encephalitis and meningoencephalitis (Centers for Disease Control and Prevention, 2020).

This research still has some limitations. One of the biggest limitations in this study is that this study is conducted retrospectively so that the results depend on the completeness of the patient's medical records. Further prospective research is needed to determine the types of comorbidities that will affect and have a risk of COVID-19 severity in children.

## CONCLUSION

Based on the results of research on the relationship between age, gender, and comorbidities with the degree of *Covid-19* in children at Haji Adam Malik Central General Hospital Medan, the demographic characteristics show that there is no significant relationship between the age group of children or sex and the severity of infection. Regarding comorbidities in *COVID-19* patients, the most common were disorders of the heart and blood vessels, renal and urinary tract, and nervous system, with a mortality rate of 13.4% and a recovery rate of 81%. In contrast, *COVID-19* cases without comorbidities had a 100% recovery rate and no deaths. Bivariate analysis demonstrated a significant relationship between diseases of the heart and blood vessels, renal and urinary tract, and nervous system, and the severity of *COVID-19* disease. Multivariate analysis confirmed that children with heart and blood vessel, renal and urinary tract, and nervous system disorders are more likely to be at risk for severe *COVID-19* compared to children without these comorbidities.

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