

Analysis of determinant factors with the severity of COVID-19 in pregnancy

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Abstract. In Indonesia as well as other countries, pregnant women are considerably more likely to have COVID-19. According to data, 1.3% of pregnant women with the infection needed mechanical breathing and intensive care unit treatment. The purpose of this study was to ascertain the association between the severity of COVID-19 in pregnant women and variables such age, gestational age, blood type, immunization status, and comorbidities. 40 pregnant women having a COVID-19 diagnosis between 2021 and 2023 were sampled for a correlational study design at a Lampung hospital. The Pearson correlation test was utilized for data analysis. The findings demonstrated a significant relationship between COVID-19 severity and gestational age, blood type, and immunization status (p-value <0.05). On the other hand, there was no statistically significant correlation between maternal age and comorbidities (p-value >0.05). Early gestational age, certain blood types (A, B, and AB), and immunization status are important factors impacting the severity of COVID-19 in pregnant women, according to the study's findings. In order to lessen the severity of COVID-19, health care practitioners are urged to ensure that pregnant women receive vaccinations and to provide close monitoring during the first trimester of pregnancy, particularly for those with blood types A, B, or AB.

1 Introduction

In various countries, it shows that the prevalence rate of Covid-19 in pregnant women varies. In 2021, based on data from the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), around 10%-15% of pregnant women worldwide were infected with Covid-19, ranging from mild to severe symptoms requiring hospitalization [1]–[3].

In Asia, the prevalence of Covid-19 in pregnant women has increased significantly, especially during the major wave of the pandemic in 2021. In India during the peak of the pandemic, thousands of pregnant women were reported to have been infected with severe

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symptoms and required intensive care, while South Korea and Japan showed a lower prevalence due to strict health policies and high vaccination rates. In Indonesia, cases of Covid-19 in pregnant women have also shown a significant increase in various regions [4], [5]. Based on data from the Ministry of Health of the Republic of Indonesia, pregnant women are a group that is vulnerable to Covid-19 infection ranging from moderate to severe symptoms. The high rate of Covid-19 transmission in pregnant women in Indonesia requires special attention from health workers to prevent the risk of further complications [6].

By the end of 2021, there were more than 35,000 cases of Covid-19 involving pregnant women. A study conducted at several hospitals in Jakarta also found that around 10-15% of pregnant women treated at the hospital [7]. Many of them experienced complications, such as preeclampsia, premature birth, and even some cases of maternal death. Limited access to health facilities during the peak of the pandemic in some areas was also a factor that worsened the condition of infected pregnant women.

Studies show that 3-7% of pregnant women who experience Covid-19 are treated in the ICU, 2-4% require mechanical ventilation due to severe respiratory problems, 15-25% experience premature labor and are at 4 times higher risk of death compared to pregnant women who do not have Covid-19 [2], [3].

Previous research involving 2130 pregnant women in 18 countries that pregnant women infected with Covid-19 have a 50% higher risk of experiencing serious pregnancy complications such as preeclampsia, eclampsia, and premature birth. Pregnant women with comorbid diabetes mellitus, obesity and hypertension are at greater risk of experiencing severe Covid-19 symptoms. According to research in several large hospitals in India, around 5-10% of infected pregnant women require intensive care, and the mortality rate in this group reaches 1-3% [8]. The efforts made by the government to address covid-19 include enhancing healthcare system capacity, controlling transmission, mass vaccination, and providing social and economic support.

In Indonesia, there has been an increase in ICU care and mechanical ventilation by 1.3% of the total pregnant women infected with Covid-19 1.3%. This severity occurs in pregnant women who have risk factors such as age over 35 years, comorbidities such as diabetes, hypertension, and obesity, as well as poor nutritional status and pregnant women from low economic backgrounds tend to have limited access to adequate health services [3], [6]. The covid-19 handling efforts by the government include vaccinating pregnant women, implementing health protocols for pregnant women who are about to give birth, and researching the impact of covid-19 on the health of mothers and newborns. Research that discusses the determinant factors of the severity of Covid-19 in pregnant women is still limited, however, some of these studies discuss the administration of the Covid-19 vaccine during pregnancy and the transmission of Covid-19 [9], [10].

The purpose of this study was to determine the relationship between determinants such as age, gestational age, blood type, vaccination status, and comorbidities with the severity of Covid-19 in pregnant women and provide an overview of policies in preventing the severity of Covid-19 in pregnant women.

2 Method

2.1 Study Design

The design of this study is a correlation to identify the relationship between factors such as gestational age, blood type, vaccination status, comorbidities, and the severity of COVID-19 in pregnant women.

2.2 Study Location

This research was conducted at a Hospital in Lampung

2.3 Population and Sample

The population in this study consists of pregnant women hospitalized in hospitals in Lampung Province. The sample includes 40 pregnant women infected with COVID-19 from 2021 to 2023. The sampling technique used is total sampling, with the inclusion criteria being pregnant women hospitalized with COVID-19 infection. The study was conducted in December 2022 and December 2023.

2.4 The Variable, Instrument, and Measurement

There are two main types of variables in this study, namely independent variables and dependent variables. The independent variables in the study are age, gestational age, blood type, vaccination status, comorbidities, while the dependent variable in this study is the severity of Covid-19 in pregnant women. The type of data used is secondary data taken from patient medical records including data on pregnant women infected with Covid-19, age, gestational age, blood type, vaccination status, comorbidities with the severity of Covid-19.

2.5 Data Analysis

The data analysis used in this study is the Pearson correlation to explore the relationship between the determinant variables of age, gestational age, blood type, vaccination status, comorbidities with the severity of Covid-19. Ethical license has been obtained from the Health Research Ethics Commission of Harapan Bangsa University with number B.LPPM-UHB.1464/12/2022.

3 Results and Discussion

3.1 Result

The results of the research on the frequency distribution of each variable can be seen in the following table 1.

Based on the results of the frequency distribution analysis, the following insights can be derived Among the sample, Covid-19 severity was evenly distributed across categories. Mild cases accounted for 32.5%, moderate cases 35.0%, and severe cases also 32.5%. The majority of participants (72.5%) were between 20 and 35 years old, with 27.5% over 35. There were no participants below 20 years. Most participants were in their third trimester (75.0%), while 15.0% were in their second trimester and 10.0% in their first trimester. A large portion (80.0%) had received a covid-19 vaccine, while 20.0% were unvaccinated. Blood types showed a distribution where blood type O was present in 40.0% of cases, while blood types A, B, and AB collectively accounted for 60.0%. A significant portion (80.0%) of participants had comorbidities, with only 20.0% having no reported comorbidities.

This data illustrates trends that may have implications for healthcare management in pregnant women with covid-19. The high proportion of comorbidities and the presence of unvaccinated individuals highlight areas where health interventions may be prioritized. Additionally, the severity distribution suggests that factors beyond age, such as gestational age and comorbidity status, could play important roles in covid-19 outcomes.

Table.1 Frequency distribution, severity of covid-19, age, gestational age, vaccination status, blood type and comorbidities

Variable	Percentage
Severity of COVID-19	
Mild	13 (32.5%)
Moderate	14 (35.0%)
Severe	13 (32.5%)
Total	100 (100%)
Age	
<20 years	0 (0%)
20 - 35 years	29 (72.5%)
>35 years	11 (27.5%)
Total	100 (100%)
Gestational age	
First trimester	4 (10.0%)
Second trimester	6 (15.0%)
Third trimester	30 (75.0%)
Total	100 (100%)
Vaccination status	
Vaccinated	32 (80.0%)
Unvaccinated	8 (20.0%)
Total	100 (100%)
Blood type	
O	16 (40.0%)
A,B,AB	32 (80.0%)
Total	100 (100%)
Comorbidity	
No comorbidities	8 (20.0%)
Comorbidities	32 (80.0%)
Total	100 00%

The results of the study showed that age did not have a significant correlation with a p-value of 0.225 with a correlation coefficient of 0.196 (weak positive correlation). Comorbidities did not have a significant correlation with a p-value of 0.155 with a correlation coefficient of 0.339 (weak positive correlation). Meanwhile, gestational age had a significant correlation with a p-value of 0.001 with a correlation coefficient of -0.485 (negative correlation) or as gestational age increased, the severity of Covid-19 tended to decrease. Blood type had a significant correlation with a p-value of 0.000 with a correlation coefficient of 0.823 (strong positive correlation) or pregnant women with blood type A, B, AB who were exposed to Covid-19 experienced a different level of severity than blood type O. Vaccination status had a significant correlation with a p-value of 0.000 with a correlation coefficient of 0.620 (moderate positive correlation) or pregnant women who had been vaccinated when exposed to Covid-19 experienced a different level of severity compared to those who were not vaccinated.

Table.2 Analysis of determinant factors (age, gestational age, blood type, vaccination status, comorbidities) with the level of Covid-19 susceptibility in pregnant women (n=40)

		Age	Gestational Age	Blood type	Vaccination Status	Comorbidities
Severity Level	Pearson Correlation	.196	-.485**	.823**	.620**	.155
	Sig. (2-tailed)	.225	.001	.000	.000	.339
N		40	40	40	40	40

3.2 Discussion

In this study, age did not have a significant correlation with the severity of Covid-19. This is different from previous studies which showed that the older you are, the more severe the Covid-19 will be [11], [12]. This is because as age increases, immunity and its functions decrease, such as decreased lung and heart function and are more susceptible to infection and complications. In addition, older pregnant women often have other health conditions such as hypertension or diabetes, which can worsen their condition when exposed to Covid-19, making it difficult to manage and increasing the risk of serious complications [13]–[15]. Pregnant women are very susceptible to infections and complications [16].

Comorbidities do not correlate with the severity of covid-19. This is because out of 40 pregnant women infected with covid-19, only 8 had comorbidities, so when the analysis was carried out, there was no correlation. This result is in contrast to previous research that pregnant women who have comorbidities such as diabetes mellitus and hypertension have a significant relationship with the severity of covid- 19 and are at risk of experiencing serious complications [17], [18]. However, several studies support this finding, indicating that comorbidities such as obesity and hypertension have a greater impact on the severity of covid-19 in pregnant women than age. The age of the pregnant woman is not significantly associated with an increased risk of severe covid-19, while other factors, such as comorbidities, play a larger role [19], [20].

The findings in this study show a significant correlation with a negative direction as the gestational age increases, the risk of severity in covid-19 sufferers decreases. The results of this study are in contrast to previous studies that showed that pregnant women at a later gestational age experienced more severe complications compared to those in the first trimester [21].

There is a significant correlation between blood type and the level of covid- 19 severity. Pregnant women with blood type A, B, AB have a higher risk of experiencing severity when infected with covid-19, compared to mothers with O blood type. This result is supported by previous studies showing that blood types A and B have a higher risk of experiencing severe covid-19 compared to O blood type [18]. In addition, pregnant women with blood type A are more susceptible to complications caused by covid-19 compared to those with O blood type [22], [23]. Other findings also revealed that pregnant women with blood types A and B have a higher risk of experiencing severe covid-19 [23].

The results of the study showed a positive correlation between vaccination status and the severity of covid-19, meaning that pregnant women who were not vaccinated against covid-19 had a higher severity than pregnant women who were vaccinated. This is supported by previous studies that show that vaccination status determines the severity of covid-19 [18]. Covid-19 vaccine for pregnant women has been proven to have no adverse effects during pregnancy and childbirth. Of course, this finding can help pregnant women and health facilities to motivate pregnant women regarding vaccination [24]. This vaccine can provide

protection for mothers and fetuses from bad complications due to covid-19 infection according to the recommended dose and following the vaccine schedule according to the provisions. In addition, the benefits of the vaccine are greater than the risks of covid-19 both during pregnancy and childbirth [25].

4 Conclusions and Recommendation

The conclusion of this study is that gestational age, blood type, and vaccination status have a significant correlation with the severity of COVID-19 in pregnant women. The recommendation is for healthcare providers to increase awareness of health risks for pregnant women with COVID-19, support health policy implications especially by promoting broader and more targeted vaccination efforts for pregnant women and emphasize clinical relevance. By identifying more specific risk factors, healthcare providers can design monitoring and care protocols that are more targeted, particularly for pregnant women with certain blood types and early gestational age. Furthermore, the study provides practical guidelines for counseling and health education for pregnant women.

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