

## Effect of Pregnancy towards Prognosis of Women and Babies with COVID-19

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### Abstract

**Objective:** Analyzing the relationship of pregnancy with COVID-19 towards the prognostic profiles in mothers and babies.

**Method:** Observational analytics with cross sectional study approach. Data collection through medical records of pregnant women infected with COVID-19 who were treated at Kebayoran Lama Hospital from October 2020 to September 2021.

**Results:** Chi-square statistical test between among women with COVID-19 on prognostic profiles obtained probability value  $p$ -value = 0.001 ( $p$ -value <0.05) and Chi-square statistical test among pregnant women with COVID-19 on prognostic profiles in infants obtained a probability value of 0.0001 ( $p$ -value <0.05).

**Conclusion:** Aspects of severity and duration of treatment in cases of pregnancy with COVID-19 are positively related to the prognostic profiles in pregnant women at Kebayoran Lama Hospital. Aspects of COVID-19 exposure in infants, length of treatment, and complication status in cases of pregnancy with COVID-19 are positively related to the prognostic profiles in infants at Kebayoran Lama Hospital.

**Key words:** COVID-19, pregnancy, prognosis, mother, baby

## Pengaruh Kehamilan terhadap Prognosis Wanita dan Bayi dengan COVID-19

### Abstrak

**Tujuan:** Menganalisis hubungan kehamilan dengan COVID-19 terhadap profil prognosis pada ibu dan bayi.

**Metode:** Analitik observasional dengan pendekatan studi potong lintang. Pengambilan data melalui rekam medis ibu hamil yang terinfeksi COVID-19 yang dirawat di Rumah Sakit Kebayoran Lama sejak Oktober 2020 sampai dengan September 2021.

**Hasil:** Uji statistik *Chi-square* antara ibu hamil dengan COVID-19 terhadap profil prognosis mendapatkan nilai probabilitas  $p$ -value = 0,001 (nilai  $p$ <0,05) dan uji statistik *Chi-square* antara ibu hamil dengan COVID-19 terhadap profil prognosis pada bayi didapatkan nilai probabilitas sebesar 0,0001 ( $p$  value <0,05).

**Kesimpulan:** Aspek derajat keparahan dan lama perawatan dalam kasus kehamilan dengan COVID-19 berhubungan positif terhadap profil prognosis pada ibu hamil di Rumah Sakit Kebayoran Lama. Aspek paparan COVID-19 pada bayi, lama perawatan, dan status komplikasi pada kasus kehamilan dengan COVID-19 berhubungan positif terhadap profil prognosis pada bayi di Rumah Sakit Kebayoran Lama.

**Kata kunci:** kehamilan, COVID-19, prognosis, ibu, bayi

## Introduction

Efforts to improve the health status of mothers and infants in Indonesia are one of the priority programs, where Infant Mortality Rate and Maternal Mortality Rate (MMR) are important indicators in assessing the degree of public health.<sup>1</sup> The general welfare of the population is described in the Infant Mortality Rate and Maternal Mortality Rate which are two of the indicators that have high leverage. This figure is very sensitive to changes in the level of health and well-being. The infant mortality rate can be defined as deaths that occur between the time after the baby is born until the baby is not exactly one year old. The infant mortality profile has become a key goal for achieving the Sustainable Development Goals (SDGs).<sup>2</sup>

Based on WHO data in 2020, the United States was ranked first with the most COVID-19 cases with the addition of 19,332 new cases, followed by Spain with 6,549 new cases. There were 693,224 deaths and 33,106 deaths worldwide. Europe and North America have been at the center of the COVID-19 pandemic, with cases and deaths already surpassing China. The highest mortality rate in the world is in Italy at 11.3%. The COVID-19 mortality rate in 2020 in Indonesia was 8.9%, in which this figure is the highest in Southeast Asia. Morbidity and mortality in pregnant and maternity women and newborns have long been a problem, especially in developing countries. The world is currently experiencing global health problems since the emergence of the SARS-Cov-2 virus that causes COVID-19 disease. The Indonesian Society of Obstetrics and Gynecology noted that the death of pregnant women with COVID-19 contributed 20 percent to the mortality rate of pregnant women in Indonesia. Even the data collected in July 2020 tripled the number of deaths.<sup>3</sup>

Of the 18 pregnancies with COVID-19 outlined in two reports, all were infected in

the third trimester, and clinical findings in pregnant women were similar to those of non-pregnant adults.<sup>4</sup> Cases of pregnant women reported in 2021 with suspected, probable, and even confirmed COVID-19 criteria had increased. It was recorded that in Banyumas Regency (April 2020), there were 2 pregnant women (aged 26 and 31 years old) who died and were the Patients Under Surveillance group. In DKI Jakarta Province, especially at Kebayoran Lama Hospital, since October 2020, it has become a full COVID-19 hospital that serves referrals for COVID-19 cases, including pregnant women who are confirmed with COVID-19. It is reported that Kebayoran Lama Hospital receives the most treatment visits for pregnant women with COVID-19 with an increasing trend every month. Secondary data on medical records obtained from October 2020 to September 2021 show that there were 198 pregnant patients with COVID-19 who were treated at Kebayoran Lama Hospital, with the number of deliveries from mothers with COVID-19 totaling 178 people, and the obstetric status and prognosis varied both in mothers and their babies. The diagnosis of COVID-19 is confirmed through Polymerase Chain Reaction (PCR) examination which is a method of examining the SARS-Cov-2 virus by detecting Virus DNA.<sup>5</sup>

The prognostic profile can be improved to good which is characterized by symptoms of improvement in the condition, while the prognostic profile can also be a continued risk characterized by worsening of clinical conditions and diagnostic examination features.<sup>6</sup> The prognostic profiles in mothers and babies due to COVID-19 infection arises if further complications occur. This condition increases the risk of failure of the baby to live normally and survive life expectancy in infants and mothers, which can increase maternal and infant mortality rates caused by COVID-19 confirmation status.<sup>7</sup> With the development of Social Gynecological Obstetrics which

is theoretically epidemiological it can be overcome through directed research using existing and reliable data.<sup>8</sup>

Pregnant women with confirmed conditions of COVID-19 are a big problem that occurs because they increase the risk of maternal and infant death, so directed research on the prognostic profiles of mothers and babies of pregnant women with COVID-19 will provide an overview of the output of the condition of mothers and babies so that this research can be used as a benchmark in improving promotive and preventive services for pregnant women, especially during the COVID-19 pandemic which is currently happening globally in all over the world.<sup>9</sup> The purpose of this study is to analyze the relationship of pregnancy with COVID-19 towards the prognostic profiles in mothers and babies.

**Method**

This study was an analytical observational study with a retrospective cross sectional study design. The scope of this study is hospital-based with a retrospective study design using secondary data on the medical records of maternal patients confirmed with COVID-19 at Kebayoran Lama Hospital.

Inclusion Criteria:

1. Medical record data of pregnant women confirmed with COVID-19 based on PCR examination.

2. Medical record data of pregnant women who do not have comorbidities (DM, Hypertension, Heart Disorders, Stroke, Bronchial Ashma, and Autoimmune Diseases).
3. Medical record data of pregnant women who do not have obstetric complications (Preeclampsia, eclampsia, KPD, and ante partum hemorrhage).
4. Medical record data of babies born to mothers confirmed with COVID-19
5. Maternal and infant mortality data

Exclusion Criteria: Medical record data of pregnant women and infants who do not have complete records on medical record status.

**Results**

The table above explains the comparison between Pregnancy with COVID-19 and the prognostic profiles of Mothers and Babies. In the improved maternal prognosis group, mild COVID-19 degree was 73 or 86.9%, moderate COVID-19 degree was 10 or 11.9%, severe COVID-19 degree was 1 or 1.2%, and critical COVID-19 degree was 0 or 0.0%.

In the worsened maternal prognosis group, the degree of mild COVID-19 was 12 or 14.3%, moderate COVID-19 was 55 or 65.5%, severe COVID-19 was 15 or 17.9%, and critical COVID-19 was 2 or 2.4%.

For analysis on categorical data in the table above, it was tested using Kolmogorov Smirnov’s statistical test, namely the

**Table 1 The Relationship Between Pregnancy with COVID-19 and the Prognostic Profiles of Mothers at Kebayoran Lama Hospital in 2021**

Variable	Maternal Prognostic Profile		P-value
	Improve N = 84	Worse N = 84	
Degree of COVID-19			<b>0.0001**</b>
Mild	73 (86.9%)	12 (14.3%)	
Moderate	10 (11.9%)	55 (65.5%)	
Severe	1 (1.2%)	15 (17.9%)	
Critical	0 (0.0%)	2 (2.4%)	

**Table 2 Relative Prevalence between Pregnancy with COVID-19 and Maternal Prognostic Profiles at Kebayoran Lama Hospital in 2021**

Degree of COVID-19	Maternal Prognostic Profile		RR (CI 95%)	P-value
	Improve	Worse		
Mild	73 (85.9%)	12 (14.1%)	5.582	0.0001**
Moderate	10 (15.4%)	55 (84.6%)	(3.136-9.937)	
Moderate	10 (15.4%)	55 (84.6%)	2.462	0.684
Severe	1 (6.3%)	15 (93.8%)	(0.339-17.855)	
Severe	1 (6.3%)	15 (93.8%)	0.938	1.000
Critical	0 (0.0%)	2 (100.0%)	(0.826-1.064)	
Mild	73 (85.9%)	12 (14.1%)	0.141	0.024*
Critical	0 (0.0%)	2 (100.0%)	(0.084-0.238)	

**Table 3 Relationship of Characteristics with Infant Prognostic Profiles at Kebayoran Lama Hospital in 2021**

Variable	Infant Prognostic Profile		P-value
	Improve N = 154	Worse N = 14	
<b>Exposure to COVID-19 in Infants</b>			<b>0.0001**</b>
Not exposed	154 (100.0%)	8 (57.1%)	
Exposed	0 (0.0%)	6 (42.9%)	
<b>Duration of Care Baby</b>			<b>0.0001**</b>
≤ 7 days	151 (98.1%)	4 (28.6%)	
> 7 days	3 (1.9%)	10 (71.4%)	

COVID-19 Degree. The results of statistical tests in the research groups above obtained information on the p-value on the variable COVID-19 Degree smaller than 0.05 (p-value <0.05) which means statistically significant or meaningful, thus it can be explained that there is a statistically significant proportion difference between the variable COVID-19 Degree in the improved and worsened Maternal Prognosis groups.

From the PR values above, it can be concluded that the possibility of patients with mild COVID-19 degree to improve is 5.582 times compared to patients with moderate Covid-19 degree with a confidence interval of 3.136-9.937. From the PR values above, it can be concluded that the possibility of

patients with moderate COVID-19 degree to improve is 2.462 times compared to patients with severe COVID-19 degree with a confidence interval of (0.339-17.855).

From the PR values above, it can be concluded that the possibility of patients with severe COVID-19 degree to improve is 0.938 times compared to patients with critical COVID-19 degree with a confidence interval of 0.826-1.064. From the PR values above, it can be concluded that the possibility of patients with mild COVID-19 degree to improve is 0.141 times compared to patients with critical COVID-19 degree with a confidence interval of 0.084-0.238.

The table above describes the comparison between the characteristics of infants with

**Table 4 The Relationship between Infant Complication Status and Infant Prognostic Profiles at Kebayoran Lama Hospital in 2021**

Variable	Infant Prognostic Profile		RR (CI 95%)	P-value
	Improve N = 154	Worse N = 14		
<b>Infant Complication Status</b>			0.00	0.0001*
No complications	154 (100.0%)	0 (0.0%)	0.00- (0.00)	
There are complications	0 (0.0%)	14 (100.0%)		

COVID-2019 and the prognostic profiles of infants.

For analysis on categorical data in the table above, it was tested using the Exact Fisher statistical test, namely the variables of COVID-19 exposure in infants and the duration of infant care. The results of statistical tests in the research groups above obtained information on the p-value on the variables COVID-19 exposure in infants and the length of care for infants smaller than 0.05 (p-value <0.05) which means statistically significant or meaningful, thus it can be explained that there is a statistically significant proportion difference between the variables COVID-19 exposure in infants and the length of care for infants in the improved and worsened infant prognosis groups.

The table above describes the comparison between the Infant Complication Status and the Infant Prognostic Profiles. In the infant with improved prognosis group, babies with no complications were 154 or 100.0% and there were 0 or 0.0% complications. In the infant with improved prognosis group, infants who had no complications were 0 or 0.0% and there were complications as many as 14 or 100.0%.

For analysis on categorical data in the table above, it was tested using the Exact Fisher statistical test, namely Infant Complication Status. The results of statistical tests in the research groups above obtained information on the p-value on the Infant Complication Status variable smaller than 0.05 (p-value <0.05) which means statistically significant or meaningful, thus it can be explained that

there is a statistically significant proportion difference between the Infant Complication Status variables in the improved and worsened infant Prognosis groups.

Hypothesis 1 is accepted, namely that there is a relationship between pregnancy and COVID-19 on the prognostic profiles of the mothers.

From the results of research in tables 4.12 and 4.13, the categorical data of the p-value were calculated based on the Chi-Square test with Kolmogorov Smirnov and Exact Fisher tests as alternatives, then it was obtained that the p-value = 0.001 had a meaning value based on the p-value <0.05. So statistically, the value of p<0.05 has a significant meaning that has a causal relationship. So, it was concluded that the variable of pregnancy with COVID-19 has a significant relationship with the prognostic profiles in mothers at Kebayoran Lama Hospital.

Hypothesis 2 is accepted, namely that there is a relationship between pregnancy and COVID-19 on the prognostic profiles in infants in general hospitals in the Kebayoran Lama area.

From the results in tables 4.15 and 4.16, categorical data p-values were calculated based on chi-square tests with Kolmogorov Smirnov and exact fisher tests as alternatives, and then it was obtained that p-value = 0.001. The value of meaning is based on the p-value <0.05. So statistically, the value of p<0.05 has a significant meaning that has a relationship with causality. So, it was concluded that the variable of pregnancy with COVID-19 has a significant relationship with the prognostic

profiles of infants at Kebayoran Lama Regional General Hospital.

## Discussion

COVID-19 is an infectious disease that can attack vulnerable groups such as pregnant women and babies. This is as revealed by Liu Y et al. (2020), who stated that pregnant women were susceptible to Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) infection, which can increase the risk of adverse effects to pregnant women.<sup>7</sup> The number of cases of pregnant women who were confirmed positive for COVID-19 at Kebayoran Lama Hospital from October 2020 to September 2021 was 198 cases from the total number of visits to Covid-19 patients as many as 913 patients (21.6%). In this study, of the 178 cases of mothers who gave birth and met the criteria for inclusion and exclusion, 168 samples were used as respondents. The results as in table 12 above about the severity of pregnant women at Kebayoran Lama Hospital found that the highest number at mild degree was 50.6% but it was also known that the number suffering from COVID-19 at alarming degrees (moderate, severe, critical) reached 49.4%. This shows that the status of COVID-19 that attacks pregnant women puts pregnant women at risk of adverse clinical impacts. Viral factors with an immune response determine the severity of this COVID-19 infection.<sup>10</sup>

According to the study in a Literature Review titled COVID-19: Pathogenesis, Clinical Manifestations, and Choice of therapy conducted by Yelvi Levani et al. (2021), the cytopathic effect of the virus and its ability to defeat the immune response are factors in the severity of viral infection. An inadequate immune system in responding to infection also determines the severity of COVID-19. On the other hand, an excessive immune response also contributes to tissue damage so as to determine the extent to which

the disease progresses.<sup>11</sup>

The complication status of COVID-19 in pregnant women found in this study includes pneumonia, ARDS, organ failure, and sepsis amounting to 45.8%. Meanwhile, the status of complications in infants varies from transmission of COVID-19 to signs and symptoms that show asphyxia in infants.

Based on research conducted by Zaigham M et al. (2020), the most reported manifestations of COVID-19 infection for pregnant women are pneumonia, miscarriage, Multiple Organ Dysfunction Syndrome (MODS), Acute Respiratory Distress Syndrome (ARDS), Intrauterine Growth Restriction (IUGR), premature rupture of membranes, preterm labor, fetal tachycardia, and fetal distress. This is given that the tendency is to dysregulate the immune response and change in the respiratory microbiome after the virus invades and results in pneumonia. If there are severe clinical manifestations in the respiratory tract in the mothers and if there is transmission in the babies, it will cause asphyxia in the babies.<sup>12</sup>

Research that has been conducted by Liang et al. (2020) examined amniotic fluid, umbilical cord blood, and breast milk first after giving birth. After being examined, the samples were tested negative for COVID-19.<sup>13</sup> However, on March 26, 2020, JAMA published two reports of three newborns with elevated SARS-CoV-2 IgM antibodies, despite repeated nasopharyngeal samples from the infants being negative. In an editorial, Jinzhi Ghao and Ling Chen pointed out that IgM testing was susceptible to false positive and false negative results, along with cross-reactivity and testing challenges.<sup>14</sup> but IgG was still positive on day 50 of life. The sequential dynamic changes in antibody levels in the neonate were consistent with those in his mother. One-step reverse transcriptase droplet digital PCR testing for SARS-CoV-2 nucleic acid in throat and anal swabs showed positive results (750 and 892 copies/ml Chen

et al. (2020) also concluded that there had been no convincing evidence of intrauterine transmission so vaginal delivery was not contraindicated in patients with COVID-19. Further research is needed to further confirm the vertical transmission of COVID-19 from mothers to fetuses.<sup>15,16</sup>

The results of the study in table 2 and table 3 show that the length of treatment in pregnant women with COVID-19 has a degree of variation according to the severity of COVID-19 and the manifestation of the status of complications suffered. This is in line with research conducted by Susi Nurhayatun (2021) on the analysis of the average length of stay (avlos) of COVID-19 cases in hospitals, where the length of treatment needed by COVID-19 patients varies greatly, ranging from 7 days, 10 days, to 14 days, and the length of hospitalization depends on the clinical state sourced from the patient's diagnosis. The incubation period of COVID-19 disease lasts around 5-7 days. Thus, researchers divided the 2 lengths of hospital stay into <7 days and >7 days.<sup>17</sup>

The length of hospital stay determines how much medical service is needed to support recovery. Similarly, in patients with COVID-19, clinical manifestations determine how long a person will be treated in the hospital.<sup>18</sup>

Based on the Publication of the Journal of Respiriology by the Indonesian Lung Doctor Association (2020), the prognosis of COVID-19 patients is determined by the degree of disease and accompanying complications.<sup>19</sup> The degrees of disease mentioned are uncomplicated illness, pneumonia, ARDS, sepsis, septic shock, and multiple organ failure.<sup>20</sup>

In this study (table 3) it was found that the prognosis of pregnant women infected with COVID-19 was 50% improved and 50% worsened. Meanwhile, the prognosis in infants (table 13) was found to be 94% improved and 6% worsened. This is in line

with the research of Dimas Tri Anantyo et al. (2020) on COVID-19 in children published in the Journal of Clinical Medicine that the prognosis of COVID-19 shows that good therapeutic response and recovery occur faster in children compared to adults.<sup>21</sup>

The results in this study obtained the calculation of the Chi-square statistical test (tables 2 and 3) above the probability value of 0.001 (p-value <0.05). This shows that there is a significant relationship between pregnant women and COVID-19 on the prognostic profiles in mothers. Meanwhile, the calculation of the Chi-square statistical test (tables 3 and 4) obtained a probability value of 0.001 (p-value >0.05). This shows that there is a significant relationship between pregnant women and COVID-19 on the prognostic profiles in infants.

The results of the study conclude that pregnant women with positive COVID-19 will have a prognostic impact on the continuity of the development of the mother's condition. The milder the degree of COVID-19 will allow complications to be felt more mildly, so that the mother's prognostic profile will improve. On the contrary, the more severe the degree of COVID-19, the more complex the complications experienced will be, so that the mother's prognosis tends to worsen. This is in line with the analysis on the survival of COVID-19 patients conducted by Margareth Dwiyanti Simatupang et al. (2020) stating that the factors that affect the mortality rate of COVID-19 patients are based on the severity of symptoms, comorbid status, and age of patients. The severity is determined by the degree of COVID-19 from mild, moderate, to severe categories as well as accompanying clinical complications.<sup>22</sup>

The results of the COVID-19 pregnancy relationship test have a significant correlation value between the two variables based on the chi-square analysis in the table. This also concludes that the pregnancy status of mothers infected with COVID-19 has a

significant relationship with the prognostic profiles in infants. In this study, there were also cases of transmission of COVID-19 in infants and complications of asphyxia, although the number of cases were not many. Thus, this provides an illustration for all of us that COVID-19 pregnancy results in the threat of complications for the baby born.<sup>22</sup>

## Conclusion

Based on the results of the research obtained, it can be concluded that pregnancy with COVID-19 (severity and duration of treatment) is related to the prognostic profiles of pregnant women at Kebayoran Lama Hospital. Furthermore, pregnancy with COVID-19 (Covid-19 exposure in infants, duration of treatment, and complication status) is also associated with prognostic profiles in infants at Kebayoran Lama Hospital.

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