Effect of Corona Virus Disease 2019 (Covid-19) on the Incidence of Preterm Birth and Asphyxia At Banjar Regional General Hospital

Kulfa Sholehah,[1] Akhmad Yogi Pramatirta,[2] Firman F. Wirakusumah[2]
[1]Magister of Midwifery Study Program, Faculty of Medicine of Padjadjaran University Bandung, Indonesia
[2]Department of Obstetrics and Gynecology Faculty of Medicine Universitas Padjadjaran/ Dr. Hasan Sadikin General Hospital Bandung
Korespondensi: Kulfa Sholehah, Email : kulfa21001@mail.unpad.ac.id

Abstract
Objective: This study aims to determine and analyze the effect of Corona Virus Disease (Covid-19) on the incidence of preterm birth and asphyxia at Banjar Regional General Hospital.
Method: This was an analytical observational study with a retrospective cohort approach. The type of data involved in this study was secondary data derived from medical record with a total sample of 59 women in labor diagnosed with Covid-19 and 513 women in labor who were not diagnosed with Covid-19.
Results: The result of the study showed that there was a significant difference in the incidence of preterm birth between women in labor diagnosed with Covid-19 and those who were not diagnosed with Covid-19 (ρ value=0.000 or $\rho<0.05$). Regarding the incidence of asphyxia, the result showed that there was no difference in the incidence of asphyxia between infants born to women diagnosed with Covid-19 and those born to women who were not diagnosed with Covid-19, with a ρ value of 0.523 or $\rho>0.05$. Women diagnosed with Covid-19 were at risk of giving birth to premature infants 5.308 times compared to women not diagnosed with Covid-19. The OR of the incidence of preterm birth was 5.308 with a 95% CI of 3.035-9.281. Furthermore, based on the statistical test result, it was revealed that Covid-19 had a low effect on the incidence of asphyxia with the OR value of 0.839 and a 95% CI of 0.489-1.439.
Conclusion: Based on the results of the study, it can be concluded that there was an effect of Covid-19 just on the incidence of preterm birth.

Key words: Asphyxia, Covid-19, Premature

Pengaruh Corona Virus Disease 2019 (Covid-19) terhadap Kejadian Prematur dan Asfiksia di RSUD Kota Banjar

Abstrak
Tujuan: Penelitian ini mengukur dan menganalisis pengaruh Corona Virus Disease (Covid-19) terhadap kejadian prematur dan asfiksia di RSUD Kota Banjar.
Metode: Penelitian berupa analitik observasi dengan pendekatan kohor retrospektif. Jenis data dalam penelitian ini adalah data sekunder dari rekam medis dengan jumlah sampel menggunakan total sampel yaitu 59 ibu bersalin dengan Covid-19 dan 513 ibu bersalin tidak dengan Covid-19.
Hasil: Hasil penelitian menunjukkan terdapat perbedaan yang bermakna kejadian prematur pada Ibu Covid-19 dengan ibu yang tidak terdiagnosis Covid-19 (nilai ρ0.000) yang artinya p0.05. Ibu dengan Covid-19 berisiko melahirkan bayi prematur 5.308 kali dibandingkan pada ibu yang tidak terdiagnosis Covid-19, nilai OR kejadian prematur 5.308 dengan IK 95% 3.035-9.281. Dan dari hasil uji statistik diperoleh hasil yaitu Covid-19 berpengaruh rendah terhadap kejadian asfiksia dengan hasil uji statistik nilai OR 0.839 dengan IK 95% 0.489-1.439.
Kesimpulan: Dari hasil penelitian dapat disimpulkan bahwa terdapat pengaruh Covid-19 terhadap kejadian prematur.

Kata kunci: Asfiksia, Covid-19, Prematur

Background

Corona Virus Disease (Covid-19) has become a pandemic experienced by many countries around the world. Covid-19 disease is a respiratory tract infection caused by a corona virus that was first discovered in Wuhan, China in 2019. Corona virus is a type of betacoronavirus that is closely related to the severe acute respiratory syndrome (SARS) virus. Corona Virus Disease (Covid-19) causes severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS). In March 2020, Corona Virus Disease 2019 (Covid-19) case was found in Indonesia, and showed an increase in the incidence of confirmed cases every day. The Indonesian government declared it a Public Health Emergency and Non-Natural National Disaster of Covid-19. Almost all health services have been affected the Covid-19 pandemic, including maternal and neonatal health services, both in terms of access and quality of health services.[1]

The health problems faced by the Indonesian state are focused among the mother and child group, marked by the still high maternal mortality rate (MMR) and infant mortality rate (IMR) in Indonesia. High maternal and infant mortality rates are the indication of the country's aub-optimal ability to provide health services to the community. Based on data derived from the Directorate of Public Health of the Ministry of Health of the Republic of Indonesia in 2021, the highest number of under-five deaths in Indonesia occurred during the neonatal period by 72.0% (20,266 deaths), followed by children aged 29 days - 11 months by 19.1% (5,386 deaths) and children aged 12-59 months by 9.9% (2,506 deaths). The most common cause of neonatal death is Low Birth Weight (LBW) by 35.2%. The second cause of neonatal death is asphyxia by 27.4%. Other causes of death include infections, congenital abnormalities, neonatal tetanus and other causes.[2,3]

At the UN general assembly on September 25, 2015 in New York, the Sustainable Development Goals (SDGs) were officially endorsed as a global development agreement. Maternal and infant health degrees are involved in the third Sustainable Development Goals (SDGs). The target of the Maternal Mortality Rate (MMR) in 2030 is to be below 70 per 100,000 live births; for the Neonatal Mortality Rate, it is to be 12 per 1,000 live births; for the Under-five Mortality Rate, it is to be 25 per 1,000 live births and there should be a decrese in premature death sdue to non-communicable diseases through prevention and treatment by 1/3.[2,4]

During the Covid-19 pandemic, pregnant women and their fetuses were a population group at high risk of being infected with Covid-19. Physiological and mechanical changes during pregnancy generally increase the risk factors for infection, especially if the cardiorespiratory system is affected, which can lead to respiratory failure in pregnant women. In a study conducted at the Hospital in New York City which in March 2020, it was found that 43 pregnant women were positive for Covid-19, and there were complications found in the fetus, namely preterm or preterm birth (43%), Intrauterine Growth Restrictions (IUGR) (9%), miscarriage or stillbirth (2%), and neonatal death (2%).[5]

A study conduced by the Center for Disease Control (CDC) showed that pregnant women who were confirmed positive for Covid-19 were three times more likely to experience preterm birth compared to those who were not confirmed positive for Covid-19. Based on the results of such study, preterm births related to Covid-19 increased by 12.6% and as many as 2.2% experienced miscarriages. The proportion of pregnant women who were hospitalized due to Covid-19 was higher than women who were not pregnant. In addition, as many as 16.2% of pregnant women were hospitalized in the ICU and 8.5% needed a mechanical

ventilator.[6] Furthermore, based on the result of a Lancet Public Health study in 2020, preterm birth was a cause of child death globally.[7]

According to the result of study conducted by Shu Qin Wei et al. among 438,548 people on the relationship between Covid-19 morbidity and pregnancy outcomes (pregnant women with Covid-19 versus pregnant women without SARS-CoV-2 infection), it was shown that SARS-CoV-2 in pregnancy was related to preeclampsia, preterm birth and stillbirth. There was also an increased risk of preeclampsia, preterm birth and other adverse pregnancy outcomes. [9]with many survivors experiencing long-term adverse consequences. Preliminary evidence suggests that numbers of preterm births greatly reduced following implementation of policy measures aimed at mitigating the effects of the COVID-19 pandemic. We aimed to study the impact of the COVID-19 mitigation measures implemented in the Netherlands in a stepwise fashion on March 9, March 15, and March 23, 2020, on the incidence of preterm birth. Methods: We used a national quasi-experimental difference-in-regression-discontinuity approach. We used data from the neonatal dried blood spot screening programme (2010–20 Symptomatic Covid-19 was related to an increase in the risk of Caesarean Section and preterm deliveries and further causes considerable morbidity in both mother and baby compared to asymptomatic Covid-19. Severe Covid-19 in pregnancy was closely related to preterm birth since Covid-19 could impact excessive systemic inflammatory responses resulting in a sub-optimal environment for fetal growth and development as well as placental vascular malperfusion in the fetus, which could be seen on the histopathology of the placenta.[9,10]

Pregnant women are also at very high risk of being infected with Covid-19 and experiencing very severe complications. Physiological and mechanical changes in pregnant women lead to an increased vulnerability of pregnant women to Covid-19 infection. The most detrimental complications due to Covid-19 infection for the fetus are the increased risk of miscarriage, premature delivery, and fetal growth retardation. Based on data derived from the Directorate of Family Health as of September 14, 2021, there were 1,086 women who died with positive PCR swabs or antigens.[11]

There are three groups of factors that can influence preterm birth, namely socio-demographic factors, obstetric and gynecological factors, and complications during pregnancy. Socio-demographic factors include maternal age at pregnancy, race/ethnicity, maternal body mass index, smoking habit, maternal stress, level of education, poverty, and other social factors. Obstetric and gynecological factors, include pregnancy interval, history of preterm birth, history of uterine curettage, cervical surgery, cervical length, and uterine malformations. The last group of factors is complicating factors during pregnancy, which include uterine bleeding in the 2nd and 3rd trimesters, fetal malformations, multiple pregnancies, maternal systemic infections and local infections such as bacterial vaginosis, and subclinical intra-amniotic infections or inflammation.

Beside experiencing severe symptoms impact, pregnant women who are infected with Covid-19 will also result in preterm birth. Babies born prematurely will have a low APGAR score (a physical examination method that is assessed based on muscle activity, heart rate, response and reflexes, appearance and especially the baby's skin color and breathing in the first minute) to respiratory failure.[12]

Asphyxia is a condition in which a baby is unable to breathe spontaneously and regularly immediately after birth and is often found among infants during or after delivery. The problem of asphyxia is related

to the state of the maternal health status, the condition of the umbilical cord or problems in the baby during or after delivery. Infants who previously experienced fetal distress will also experience asphyxia after being born. Asphyxia status in infants can be determined from the APGAR assessment in the first minute of birth.[13]

Many factors affect the APGAR score and the most important one is gestational age. 18% of APGAR values are affected by singleton pregnancy, full term, amniotic fluid mixed with meconium, low birth weight. Nutrition during pregnancy also plays an important role in the APGAR score. Inadequate dietary intake during pregnancy can increase the likelihood of a low APGAR score. Food intake will affect nutritional status and determine the APGAR value of the infant immediately after birth. [14,15]

This study aims to determine and analyze the effect of Corona Virus Disease (Covid-19) on the incidence of preterm birth and asphyxia at Banjar Regional General Hospital. Banjar Regional General Hospital is one of the Covid-19 referral hospitals in the West Java region. Regarding delivery and neonatal assistance facilities, such Hospital already has a specific isolation ward for mothers and babies which is equipped with a C-section operating room for women with Covid-19. Based on the delivery register at Teratai 1 delivery ward and the specific isolation delivery ward for Covid-19, it was found that there were 633 deliveries from January to December 2021. It was further found that 571 deliveries were among women with negative Covid-19 antigen swabs and a total of 62 deliveries were among women with positive Covid-19 antigen swabs.

Method

This was an analytical observational study conducted using a retrospective cohort, using secondary data derived from medical records during the period January–December 2021. Retrospective cohort design refers to a study which identifies risk factors and effects on past events.[16,17]

The population in this study involved all women in labor diagnosed with Covid-19 and those who were not diagnosed with Covid-19 and all infants born at, Teratai 1 Delivery Ward and Specific Isolation Delivery Ward for Covid-19 of Banjar Regional General Hospital from January to December2021. The study samples were selected using total sampling, wherein the sample size is the same as the population size. The study samples involved all women in labor and their infanys who met the inclusion criteria, namely 59 women in labor diagnosed with Covid-19 and 513 women in labor who were not diagnosed with Covid-19. Statistical analysis was assisted by a data processing application on a computer, namely the Statistical Package for Social Science (SPSS). This study used an observational analytic study with a retrospective cohort approach, with statistical tests Mann Whitney and Regression Test. The independent variable was declared to have an effect on the incidence of preterm birth and asphyxia if the result of the statistical test showed a p value which was lower than the tolerable error value (a=5%).

Before the study was conducted, the authors submitted an application for a research permit to the Master of Midwifery Study Program, Faculty of Medicine, Padjadjaran University and further submitted research ethics approval to the Health Medicine Research Ethics Committee, Faculty of Medicine of Padjadjaran University and obtained an ethical clearance letter Number 974/UN6.KEP/EC/2022. Furthermore, the author obtained a research permit letter from the Master of Midwifery Study Program, Faculty of Medicine, Padjadjaran University Number 674/UN6.C.6.8/HM.01.04/2022 which was forwarded to the Director of Banjar Regional General Hospital, West Java.

Results

The current study explained the Effect of Corona Virus Disease 2019 (Covid-19) on the Incidence of Preterm birth and Asphyxia at Banjar Regional General Hospital. In 2021, there were 776 births at such Hospital, including deliveries in the PONEK Ward, Teratai I Delivery Ward, Teratai 2 Ward for elective CS deliveries or in the Specific Isolation Ward for women with Covid-19. In 2021, there were 617 (79.51%) cases of vaginal delivery and 159 (20.48%) cases of CS delivery.

The study was conducted among all women in labor in Teratai 1 delivery ward and the Covid-19 Specific Isolation Ward at Banjar Regional General Hospital, West Java in January-December 2021. Data obtained according to the inclusion criteria involved 59 women in labor with positive antigen and 513 women in labor with negative antigen. The basic data recorded were the characteristics of women including age, education, parity, type of delivery, prematurity and asphyxia incidence. Data on the characteristics of the study subjects are presented in table 1

The description of charactersitics of women diagnosed with of Covid-19 pesented in Table 1 revealed that most of respondents aged 20–35 years by 74.7%, whereas 20.3% of them aged more than 35 years and 5% of them aged less than 20 years . Table 1 further showed that most of respondents had junior high school education by 42.4% and were multiparous by 55.9%.

Table 1 also showed that the most of women with Covid-19 had spontaneous delivery by 79.7%, preterm birth by 55.9% and infants with asphyxia by 47.5%.

Analysis of difference in the incidence of preterm birth among women in labor diagnosed with Covid-19 and those who were not diagnosed with Covid-19 applied unpaired comparative analysis, namely the Mann Whitney statistical test.

Based on table 2 regarding the result of the statistical test, it was obtained a ρ value of <0.001 or ρ<0.05. Thus, it can be concluded that there was a significant difference in the incidence of preterm birth between women who were diagnosed with Covid-19 and those who were not diagnosed with Covid-19.

In Table 3 revealed that the analysis obtained a ρ value of 0.523 of >0.05. Therefore, it can be concluded that there was no significant difference in the incidence of asphyxia between women diagnosed with Covid-19 and those who were not diagnosed with Covid-19.

Based on table 4, the analysis obtained an OR value for the incidence of preterm birth of 5.308 and a ρ value of <0.001. Thus, it can be concluded that Covid-19 had an effect on the incidence of preterm birth. Such finding indicated that women diagnosed with Covid-19 were at risk of giving birth to premature infants 5.308 times compared to women not diagnosed with Covid-19. Furthermore, it was obtained an OR value for the incidence of asphyxia of 0.839 with a ρ value of 0.523 or ρ<0.05. Such finding indicated that there was an effect of Covid-19 on the incidence of asphyxia but the effect was low by 0.839 times.

Discussion

Preterm birth is labor that takes place before even 37 weeks of gestation. Less gestational age results in high infant mortality and morbidity rates because infants have not been able to adapt the environment outside the uterus as a result of the immaturity of the organs, including the lungs, kidneys, heart, liver and digestive system.[18]

According to the World Health Organization (WHO) report in 2018, there were 15 million babies born prematurely worldwide, with a ratio of more than 1:10 each year. The incidence of prematurity was more than 60% in Africa and South Asia. As

Table 1 Characteristics of Women in Labor

Characteristic	Women in Labor		P value
	Positive Antigen (n=59)	Negative Antigen (n=513)	
Age			0.437*
<20 years	3 (5.1)	50 (9.8)	
20-35 years	44 (74.6)	349 (68.0)	
>35 years	12 (20.3)	114 (22.2)	
Education			0.982*
Elementary	8 (13.6)	61 (11.9)	
JHS	25 (42.4)	227 (44.3)	
SHS	22 (37.3)	192 (37.4)	
Higher Education	4 (6.8)	33 (6.4)	
Parity			0.952*
1	22 (37.3)	200 (38.9)	
2-4	33 (55.9)	276 (53.8)	
≥5	4 (6.8)	37 (7.3)	
Delivery			0.137**
Spontaneous	47 (79.7)	379 (73.9)	
Vacuum	2 (3.4)	61 (11.9)	
Caesarean Section	10 (16.9)	73 (14.2)	
Preterm birth			<0.001**
Yes	33 (55.9)	99 (19.4)	
No	26 (44.1)	414 (80.6)	
Asphyxia			0.523**
Yes	28 (47.5)	266 (51.8)	
No	31 (52.5)	247 (48.2)	

Information : *Chi-Square test, **Mann Whitney test

Table 2 Difference in the Incidence of Preterm Birth Among Women in labor Diagnosed with Covid-19 and those who were not Diagnosed with Covid-19

	Preterm birth		ρ value
	Premature	Non Premature	
Covid-19	33 (55.9%)	26 (44.1%)	<0.001
Non Covid-19	99 (19.3%)	414 (80.7%)	

Information: Analysis using Mann Whitney test

Table 3 Difference in the Incidence of Asphyxia Among Women in Labor Diagnosed with Covid-19 and those who were not Diagnosed with Covid-19

	Asphyxia		ρ value
	Asphyxia	Non Asphyxia	
Covid-19	28 (47.5%)	31 (52.5%)	0.523
Non Covid-19	266 (51.9%)	247 (48.1%)	

Information: Analysis using Mann Whitney test

Table 4 Effect of Covid-19 on the Incidence of Preterm Birth and Asphyxia

	Coefficient B	SE (B)	OR	95% CI	ρ value
Premature	1.669	0.285	5.308	3.035-9.281	<0.001
Asphyxia	-0.176	0.275	0.839	0.489-1.439	0.523

Information: Analysis using Regression Test

many as one million babies born prematurely died due to complications due to preterm birth, such as mental retardation, hearing loss and visual impairment. Preterm birth is the second highest cause of death among under-five children after pneumonia. Prematurity in Indonesia is still high, and according to WHO report, it was the fifth highest case with a total of 675,700 cases.[19]

Corona Virus Disease 19 (Covid-19 or commonly referred to as SARS-CoV-2) is an RNA virus with a positive single strand that infects the respiratory tract and causes severe respiratory syndrome. According to WHO in 2022, since the outbreak in Wuhan China in December 2019, a total of 340 million confirmed cases had been found worldwide with a total of 5.5 million cases of death. Pregnant women have a higher risk of being infected with Covid-19, wiith adverse impacts for both the mother and the fetus. A pregnant woman who is infected with Covid-19 will experience an increase in cytokine levels in the body which will lead to an increase in pro-inflammation in pregnancy. This condition can increase uterine contractions which may lead to premature rupture of the membranes and ultimately preterm birth.[2]we performed a meta-analysis to estimate the frequency of intrauterine growth restriction (IUGR[0]

Based on the statistical test results of this study, it was found that there was a significant difference in the incidence of preterm birth between women diagnised with Covid-19 and those who were not diagnosed with Covid-19. There were 55.9% of preterm births among women diagnosed with Covid-19. In contrast, there were 19.3% or 99 preterm births among women who were not diagnosed with Covid-19. Such finding is in accordance with a study conducted in a systematic literature review by Christn Fourta Hutagaol in 2020-2021 which found that Covid-19 infection could lead to certain complications regarding maternal and neonatal conditions, especially regarding pregnancy outcome of preterm birth.

The causes of preterm birth include iatrogenic (20%), infection (30%), premature rupture of membranes (20-25%), and spontaneous preterm birth (20-25%).[21] Theoretically, the risk factors for prematurity are divided into 4 factors, namely iatrogenic factors, maternal factors, fetal factors, and behavioral factors. Iatrogenic factors that influence preterm birth are factors regarding maternal medical health. Maternal factors include previous history of prematurity, maternal age, maternal parity, placenta previa, cervical abnormalities (cervical incompetence), hydramnios, intra-amniotic infection, hypertension and trauma. Fetal factors that affect preterm birth include twin pregnancies, Intra Uterine Fetal Death

(IUFD), and congenital defects or congenital abnormalities. Behavioral factors that influence preterm birth include history of smoking and alcohol consumption.

The Covid-19 virus attacks the lungs via the ACE 2 receptor and a series of mechanisms that cause a cytokine storm. In pregnant women who are infected with Covid-19, the placental blood barrier is damaged so that Covid IgM from the mother can enter the fetus, and the Covid virus can also enter the fetus through the umbilical cord. According to POGI on June 22, 2021 Covid-19 in pregnant women increased the risk of preterm birth and other complications such as stillbirth.

Preterm birth is due to multifactorial causes, a combination of obstetric conditions and socio-demographic factors. One of the factors that influence preterm birth is maternal or fetal distress, which can lead to activation of the hypothalamic pituitary adrenal gland axis so that cortisol will increase which further increase CRH production in the decidual amnion corion a swell as prostaglandins, thereby increasing uterine contractions and cause preterm birth.

At Banjar Regional General Hospital, women in labnor with Covid-19 found out that they had confirmed Covid-19 when they came to the hospital and the delivery assistance process was carried out in the specific isolation ward for Covid-19 without any companion. It is necessary to carry out further study on the factors that influence the incidence of preterm birth in the specific isolation delivery ward for Covid-19.

Neonatal asphyxia is a condition that occurs when a infant does not get enough oxygen during the labor and delivery. This disease is also defined as failure to initiate normal respiration within one minute of birth. Neonatal asphyxia is a neonatal emergency since it can cause hypoxia (decreased oxygen supply to the brain and tissues) and brain damage or possibly death if not managed properly.

Neonatal asphyxia can be caused by maternal or infant factors. Maternal factors include gestational age and maternal disease. One of the infant factors that influence it is the birth weight. Gestational age is a measure of the length of time a fetus is in the uterus.[22]

Covid-19 infection and other diseases that occur during pregnancy women may result in complications in the fetus that is born and even death.[4] A literature study conducted on the effect of Corona Virus Disease (Covid-19) on pregnancy in December 2019 – August 2020 obtained the effect size of Covid-19 on the incidence of preterm birth by 41% and on the incidence of asphyxia by 17%.[23]

Based on the study findings, the incidence of asphyxia among infants born to women with Covid-19 was 47.5%, namely 28 cases and 31 infants didn't experience asphyxia (52.5%). On the other hand, the incidence of asphyxia among infants born to women who were not diagnosed with Covid-19 was 51.9%, namely 266 cases and 247 infants didn't experience asphyxia (48.1%). Based on the results of the Mann Whitney statistical test, it was obtained a ρ value of 0.523 or >0.05. Therefore, the hypothesis was not accepted, and it can be interpreted that there was no difference in the incidence of asphyxia between infants born to women diagnosed with Covid-19 and those born to women who were not diagnosed with Covid-19.

The study finding is in accordance with a study which found that one of the impacts of Covid-19 in pregnancy was oligohydramnios. Although Covid-19 affects the amniotic fluid, it does not affect the placenta. No damage was found in the placenta of pregnant women who were infected with Covid-19. The placenta is a site for circulation of blood and oxygen for the fetus, so when there is no damage to the placenta, the flow of oxygen to the fetus will remain smooth so that the baby can be born with a good APGAR score.[24]

The study finding is in line with the study conducted at the Ulin Regional General Hospital in Banjarmasin which found that there was no difference in the outcome between infants born to preeclampsia women with Covid-19 and infants born to preeclampsia women who not have Covid-19. A study conducted at RSUP Dr. Hasan Sadikin Central General Hospital of Bandung found that asphyxia among newborns had a significant relationship with the severity of Covid-19.[24,25]

Delivery factors make a major contribution to the incidence of neonatal asphyxia. Since the factors of delivery especially prolonged labor is included in the high risk, it is very likely that the baby born will experience neonatal asphyxia. It was found that women with prolonged labor had 3.41 higher risk of giving birth to babies with neonatal asphyxia compared to women who did not experience prolonged labour.

In the delivery care process during the Covid-19 pandemic at Banjar Regional General Hospital, women in labor with Covid-19 were not accompanied by their husbands or family members because they were placed in a specific isolation ward for Covid-19 along with procedures during the pandemic set according to Government recommendations. Family members with psoitive antigen test results are also recommended to isolate at home or in a facilities provided by the local government.

The analysis obtained an OR value for the incidence of preterm birth of 5.308 with a 95% confidence interval (CI) of 3.035-9.281 and a ρ value of 0.000 or ρ<0.05. Thus, it can be concluded that Covid-19 had an effect on the incidence of preterm birth. Such finding indicated that women diagnosed with Covid-19 were at risk of giving birth to premature infants 5.308 times compared to women not diagnosed with Covid-19. Furthermore, it was obtained an OR value for the incidence of asphyxia of 0.839 with a 95% confidence interval (CI) of 0.489-1.439 and a ρ value of 0.523 or ρ<0.05. Such finding indicated that there was an effect of Covid-19 on the incidence of asphyxia but the effect was low by 0.839 times.

A pregnant woman who is infected with Covid-19 will experience an increase in cytokine levels in the body which will lead to an increase in pro-inflammation in pregnancy. This condition can increase uterine contractions which may lead to premature rupture of the membranes and ultimately preterm birth.[20]

A study conduced by the Center for Disease Control (CDC) showed that pregnant women who were confirmed positive for Covid-19 were three times more likely to experience preterm birth compared to those who were not confirmed positive for Covid-19. Based on the results of such study, preterm births related to Covid-19 increased by 12.6% and as many as 2.2% experienced miscarriages. The proportion of pregnant women who were hospitalized due to Covid-19 was higher than women who were not pregnant. In addition, as many as 16.2% of pregnant women were hospitalized in the ICU and 8.5% needed a mechanical ventilator.[6] Furthermore, based on the result of a Lancet Public Health study in 2020, preterm birth was a cause of child death globally.[7]

According to the result of study conducted by Shu Qin Wei et al. among 438,548 people on the relationship between Covid-19 morbidity and pregnancy outcomes (pregnant women with Covid-19 versus pregnant women without SARS-CoV-2 infection), it was shown that SARS-CoV-2 in pregnancy was related to an increased risk of preeclampsia, preterm birth, stillbirth, and other adverse pregnancy outcomes.[8]

In this study, it was found that the incidence of asphyxia among women diagnosed with Covid-19 was 47.5%, as presented in table 4. Such finding requires

further study regarding the factors that influence asphyxia among women diagnosed with Covid-19. Regarding delivery care during a pandemic, women with positive antigens were placed in a specific isolation delivery ward for Covid-19 without a birth partner, either husband or family. There is an importance of further study related to delivery in the specific isolation delivery ward for Covid-19, especially in determining the factors that influence the incidence of asphyxia.

Conclusion

Based on the results of the study, it can be concluded that there was an effect of Covid-19 just on the incidence of preterm birth and the study indicates that there isn't really an effect of COVID-19 on asphyxia.

Recommendation

The suggestion from this study is that further research is recommended to analyse the factors that influence the incidence of preterm birth and asphyxia among women in labor with Covid-19.

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