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Pregnant women in the exposure to COVID-19 infection outbreak with the risk of stunting based on the growth and development of babies

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Abstract

Background: Exposure to Covid-19 that occurs in pregnancy is at risk of miscarriage, IUGR (intrauterine growth retardation) and as a predictor of detection of stunted babies associated with pregnancy and postpartum.
Purpose: To analyze pregnant women in the exposure to COVID-19 infection outbreak with the risk of stunting based on the growth and development of babies
Method: The cross-sectional population is babies aged less than 12 months and their mothers with a history of Covid-19 infected status during pregnancy. The samples were 48 two groups of infectious and non-infectious and taken by a purposive sampling technique. Researched at the polyclinic of the Covid-19 referral hospital. The statistic analyzes mean and correlation test data with Chi-Square.
Results: Age range of babies at observation was 2-12 months with a mean age of 7 months. Progression score with Pre-screening Developmental Questionnaire (PDQ) lowest 2 and highest 10. Pregnant women who are not infected are at risk stunting with the highest indicator of baby weight is normal at 70.8 percent and normal baby height at 80 percent. Pregnant women infected with Covid-19 without symptoms to moderate symptoms risk of stunting with the highest indicator of baby weight is normal ranging from 46.2 percent – 80 percent and normal baby height ranging from 80 percent - 84.6 percent. Analysis of the effect of exposure to Covid-19 during pregnancy on the risk of stunting based on the baby's weight and height had no effect (p-value > 0.05). The ratio of baby development deviations in uninfected and Covid-19 infected mothers was 16.7%. The results of the analysis of the relationship between confirmed status of Covid-19 during pregnancy and baby development are related (P value < 0.05).
Conclusion: The effect of exposure to Covid-19 during pregnancy on the risk of stunting based on the baby's weight and height has no effect. A comparison found deviations in baby development in uninfected and Covid-19 infected mothers, there was an association.

Keywords: Covid-19; Infection; Outbreak; Pregnant women; Stunting; Babies

INTRODUCTION

There were 536 cases of pregnant women with Covid-19, and 3% died (Indonesian Obstetrics and Gynecology Association, 2021). 388 pregnant women confirmed Covid-19, in the first trimester 31 (8.0%), in the second trimester 86 (22.2%), and in third trimester 271 (69.8%) (Saccone et al., 2021). SARS-CoV-2 infection during pregnancy increases the risk of pregnancy complications. Severe Covid-19 symptoms such as shortness of breath, breathing 30x/minute, 93% oxygen saturation, presence of pneumonia, accompanied by the risk of preeclampsia, gestational diabetes, cesarean delivery, premature birth, and low birth weight (Rasmussen & Jamieson, 2022).

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Other information states that pregnant women who are exposed to Covid-19 in the first trimester and experience mild symptoms such as fever, anosmia, ageusia, cough, arthralgia, diarrhea, and shortness of breath, find no evidence of an increased risk of defects or abnormalities in the fetus. fetal growth during labour. Covid-19 infection that occurs in early pregnancy is not associated with an increased risk of miscarriage, premature birth, preeclampsia, and IUGR (intrauterine growth retardation) (Cosma, Carosso, Cusato, Borella, Bertero, Bovetti, Bevilacqua, Mengozzi, Mazzone, Ghisetti, Di Perri, & Benedetto, 2022). Exposure to Covid-19 that occurred in the first, second and third trimesters did not have a significant difference between mother and baby. Mothers exposed to Covid-19 are at risk of experiencing premature labor, preeclampsia, stillbirth, and blood loss during normal delivery of more than 500 ml or more than 1000 ml for cesarean delivery. Exposure to Covid-19 that occurs in the first trimester of pregnancy is more at risk of causing a miscarriage. Meanwhile, the development of the disease when infected with Covid-19 does not differ in each trimester of pregnancy. The progress of the development of disease symptoms at the time of diagnosis of Covid-19 was asymptomatic by 10%, the symptoms were increasing. Initially asymptomatic or mild symptoms become moderate, severe, or critical symptoms about 5% (Schell, Macias, Garner, White, McIntire, Pruszynski, & Adhikari, 2022).

Likewise with the effect of Covid-19 on babies of mothers with a history of maternal infection during pregnancy. Research in Dubai states that there is a relationship between the severity of Covid-19 infection during pregnancy and its impact on the baby. Infection does not only affect the mother, but also the baby (Dileep, Zainalabdin, & Aburuz, 2022). Pregnant women with moderate to severe symptoms of Covid-19 are at risk of experiencing preterm labor, neonatal infections, low birth weight, and are at risk of being treated in the NICU room. This is because a mother who is positively diagnosed with Covid-19 has the potential to transmit the virus to her fetus while in the womb (Manurung, 2023). This happens because of the high biomarker factor coagulopathy, namely D dimer which can damage the placenta. The effect if a baby is born with a weight that does not match the gestational age and is born prematurely can have a negative impact on growth and motor development for the next life (Hsu, Pan, Lin, Lin, & Wang, 2022).

At the time of labour, babies born to mothers infected with Covid-19 can be infected and not infected. Of the 706 pregnant women diagnosed with Covid-19, 362 (16.5%) babies were born uninfected and 54 (2.5%) babies were born infected (Roggero et al. 2021). There were 11,024 Indonesian toddlers who were exposed to Covid-19 in 2020 with a recovery rate of 82.2% (Ministry of Health of the Republic of Indonesia, 2020a). Of the 145 babies born to mothers diagnosed with Covid-19, 40 (27.6%) babies were infected with Covid-19 and 105 (72.4%) babies were not infected (Manurung & Sukmawati, 2022).

Of the 353 births that occurred to mothers positive for Covid-19, 97.2% of the babies were live births, and 2.8% of the babies died (Priyadharshini, Priya, Selvameena, Waseemsha, Muthurajesh, & Shalini, 2021). The baby's condition at birth is the average normal weight of the baby, the total Apgar score ranges from 7-10 (Farhadi, Ghaffari, Mehrpisheh, Moosazadeh, Haghshenas, & Ebadi, 2022). Neonates with positive PCR tests are treated with a diagnosis of pneumomediastinum, seizures, RDS, sepsis, and jaundice (Farhadi et al., 2022). The condition of babies born to mothers infected with Covid-19 has a low birth weight of 15.2%, babies experience mild asphyxia with an apgar score of 7 to 9 95.5% and experience ARDS of 1.4% (Manurung & Sukmawati, 2022). Labor with complications and premature delivery can affect the physical condition of the baby at birth, can increase maternal and baby morbidity, can also include disabilities and growth retardation that affect physical growth and mental development (Leon, Solanky, Stalman, Demetriou, Abu-Amero, Stanier, Regan, & Moore, 2016; Zaidi, Thayath, Singh, & Sinha, 2015).

Then the Covid-19 period greatly affected the family economy which had an impact on increasing malnutrition in children under five which resulted in increased illness and death of children related to malnutrition. Currently, more than two million children are severely underweight, and more than seven million

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children under the age of 5 are stunted (United Nations International Children's Emergency Fund, 2020). Stunting is an indication of chronic malnutrition which is illustrated by a short body structure. The characteristics of wasting and stunting are low weight for age, for example children under the age of 5 years with low weight for height (wasting) and low height for age (stunting). This indicator can be considered as an indicator of malnutrition (Soliman, De Sanctis, Alaaraj, Ahmed, Alyafei, Hamed, & Soliman, 2021). Thus, WHO defines stunting as growth retardation where a child's height is less than -2 SD of body length for age z score (HAZ) or body length for age (United Nations International Children's Emergency Fund, 2023).

The incidence of stunting-detected babies is related to pregnancy and postpartum (Sartika, Khoirunnisa, Meiyetriani, Ermayani, Pramesthi, & Ananda, 2021). Several prenatal factors include maternal anemia during pregnancy, infection during pregnancy, variations in nutrition, knowledge during pregnancy related to the incidence of stunting in newborns (Lukman, Anwar, Riyadi, Harjomidjojo, & Martianto, 2021; Sartika et al., 2021). Based on this information, this study aims to analyze exposure to Covid-19 infection to the risk of stunting based on the growth and development of the baby. This information is one of the determinants of stunting risk that needs to be studied in detecting the risk of stunting in babies aged less than 12 months.

RESEARCH METHOD

The research design is cross-sectional, namely research that studies the correlation between exposure or risk factors (independent) and consequences or effects (dependent) (Harsojuwono & Arnata, 2020). This study consists of two variables, namely the independent variable is exposure to Covid-19 during pregnancy and dependent variable is the risk of stunting, namely the growth and development of the baby. The population in this study was babies. The criteria for sample inclusion are babies less than twelve months old, born to mothers with a history of Covid-19 infection during pregnancy and mothers who are not infected with Covid-19, have no congenital abnormalities. Exclusion criteria are babies who have congenital abnormalities and are more than twelve months old. The number of samples representing the population according to the research design was calculated using the two-proportion difference hypothesis test formula (Notoatmodjo, 2018). So that the sample size was 48 consisting of 24 infected with Covid-19 and 24 uninfected. The study was conducted in March 2023. Research site at one of the Covid-19 Referral Hospitals in South Jakarta. The sampling technique is purposive sampling.

The research instrument in data collection is a questionnaire consisting of demographic data, history of Covid-19 disease, symptoms of Covid-19 during pregnancy, and the growth and development of babies aged zero to 12 months. The instrument measures baby development, pre-screening questionnaire, development and growth with weight growth chart according to age, weight gain table (weight increment), body length grad according to age, length/height increment table (Ministry of Health of the Republic of Indonesia, 2020b; Ministry of Health of the Republic of Indonesia, 2020c). Prior to data collection, informed consent was carried out. Data collection was carried out at the children's poly, then checked the baby's growth, namely weight, height and development. Data analysis was carried out mean test and correlation test. The correlation test was conducted to determine whether or not there was a relationship between the effects of exposure to Covid-19 during pregnancy on the risk of stunting which was measured based on the growth and development of babies using the Chi square test. This research has passed ethical feasibility number No.252/KEPK-TJK/IV/2023.

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RESEARCH RESULTS

Table 1. Demographic Characteristic of Respondents (N=48)

Variables	Results
Mother's age (Mean±SD)(Range)(Year)	(31.21±5.57)(20-43)
Gestational age when exposed to Covid-19 (Mean±SD)(Range)(Week)	(11.90±13.18)(0-37)
Age of the baby (Mean±SD)(Range)(Month)	(7.42±3.31)(2-12)
Progress score (Mean±SD)(Range)(Month)	(8.29±1.83)(2-10)
Covid-19 Status During Pregnancy (n/%)	
Not exposed/ not infection	24/50
Asymptomatic exposure	5/10.4
Mild symptoms	13/27.1
Moderate symptoms	6/12.5
Baby Weight (n/%)	
Very Less	6/12.5
Less	11/22.9
Normal	31/64.6
Baby Height (n/%)	
Very Short	5/10.4
Short	3/6.3
Normal	40/83.3
Baby Development (n/%)	
Appropriate Age	24/50
Doubt	16/33.3
Deviate	8/16.7

Table 1 shows that babies born to mothers who are exposed and not exposed to Covid-19 are on average 31 years old. The average gestational age of the mother is 11.90 weeks. The age range of the babies observed was 2-12 months with an average age of 7 months. The lowest with Pre-screening Developmental Questionnaire (PDQ) progress score is 2 and the highest is 10.

As many as 50% of respondents were not exposed to Covid-19 and of the 24 mothers who were exposed to Covid-19 during pregnancy, 27.1% experienced mild symptoms and 12.5% experienced moderate symptoms. The majority of babies with normal weight were 64.6%, normal height was 83.3% and development according to age was 50%.

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Table 2. Pregnant Women When COVID-19 Infection Outbreak With The Risk of Stunting Babies (N=48)

Variables	Pregnant Women When COVID-19 Infection Outbreak				p-value
	Not infected (n=24)	Asymptomatic exposure (n=5)	Mild symptoms (n=13)	Moderate symptoms (n=6)	
Baby Weight (n/%)					
Very Less	2/8.3	0/0	3/23.1	1/16.7	0.67
Less	5/20.9	1/20	4/30.8	1/16.7	
Normal	17/70.8	4/80	6/46.1	4/66.6	
Baby Height (n/%)					
Very Short	2/8.3	1/20	1/7.7	1/16.7	0.83
Short	2/8.3	0/0	1/7.7	0/0	
Normal	20/83.4	4/80	11/84.6	5/83.3	
Baby Development (n/%)					
Appropriate Age	16/66.6	1/20	5/38.5	2/33.3	**0.04**
Doubt	4/16.7	3/60	6/46.1	3/50	
Deviate	4/16.7	1/20	2/15.4	1/16.7	

Table 2 shows the status of Covid-19 in pregnant women. Pregnant women who are not infected have a low risk of stunting with the highest indicator of baby weight is normal at 70.8% and normal baby height at 80%. Pregnant women infected with Covid-19 with no symptoms to moderate symptoms have a low risk of stunting with the highest indicator of baby weight is normal ranging from 46.1%-80% and normal infant height ranging from 80%-84.6%. Based on the results of an analysis of the effect of exposure to Covid-19 during pregnancy on the risk of stunting based on the baby's weight and height according to the z-score, there was no significant effect (p-value > 0.05).

Based on the status of confirmation of Covid-19 during pregnancy on the growth and development of the baby, 24 (50.0%) mothers were not infected with Covid-19, with age-appropriate development of 66.6%, doubtful 16.7% and deviant 16.7%. The results of the analysis of the relationship between confirmed Covid-19 status during pregnancy and infant development have a significant relationship (p-value <0.05).

DISCUSSION

Characteristics of the effect of exposure to Covid-19 during pregnancy on the risk of stunting is based on the growth and development of babies born to pregnant women with a history of Covid-19 infection in terms of body weight, body length based on Z-Score and development based on developmental pre-screening questionnaires. Recent studies have found that the average weight and height of a person tends to be normal. The results of this study are the same as previous studies which state that Covid-19 infection during pregnancy does not seem to affect the baby's growth, including the baby's weight and length in the first year of life. It may be necessary to observe for the next year to assess the high risk of stunting in children under five after Covid-19. Likewise, the development of babies born to mothers exposed to Covid-19 tends to be slower than babies born to mothers who were not exposed to Covid-19 during pregnancy (Miller, Joyce, Little, Stamp, & Barkley, 2023). Research at a Massachusetts hospital compared babies born to mothers infected with SARS-CoV-2 and not infected. Babies born to infected mothers mostly experience

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developmental disorders in motor or speech and language functions (Edlow, Castro, Shook, Kaimal, & Perlis, 2022).

The results of the analysis of the development of the confirmation status of Covid-19 in exposed and unexposed mothers obtained significant results. Meanwhile, body weight and height were found to be significantly less than normal. This is possibly caused by several factors that play a role in the growth and development of babies, namely breastfeeding, postpartum depression, mother's eating habits, and breastfeeding (Nguyen, Eriksson, Petzold, Bondjers, Tran, Nguyen, & Ascher, 2013; Yilgwan, Hyacinth, & Utoo , 2012). Baby growth can be seen from body weight, body length, and head circumference (Kantina, Hasmalena, & Nengsih, 2020). Baby feeding is recognized as one of the most influential factors on baby growth. Maternal characteristics such as postpartum depression and maternal eating habits can also affect the baby's weight (Yilgwan et al., 2012). Exclusive breastfeeding in babies has been shown to provide faster growth, both in weight and height, during the first six months of life compared to partially weaned and breastfed babies (Nguyen et al., 2013). So based on this research it is necessary to carry out further analysis regarding the nutritional consumption of pregnant women during Covid-19 infection so that the growth of the baby can be known.

Based on the results of an analysis of the development of Covid-19 confirmation status in exposed and unexposed mothers, a significant relationship was found. The results of this study are in line with research at Columbia University Irving Medical Center, New York which states that exposure to Covid-19 in the womb reduces gross motor, fine motor, social independence, and speech language scores on the developmental questionnaire (Wise, 2022). Adverse effects of SARS on pregnancy outcome may increase the incidence of miscarriage, fetal growth retardation, and premature or preterm labour. Inhibition of fetal growth and premature labor can cause babies to be born with low birth weight (Cunningham, Gant, & Leveno, 2012). Premature babies can experience adverse neurodevelopmental outcomes and have an impact on the baby's growth and development. Thus, a stunted baby gives an illustration of a developmental disorder. So it can be stated that Covid-19 infection during pregnancy is at risk of experiencing stunting in its development (Martin, Preedy, & Rajendram, 2021).

CONCLUSION

The demographics of pregnant women with a history of Covid-19 and non Covid-19 are adults, with babies aged 2-12 months. Pregnant women with a history of exposure to Covid-19 experience mild and moderate symptoms. Covid-19 status in uninfected pregnant women with a low risk of stunting with most indicators of normal baby weight and height. Pregnant women who are infected with Covid-19 without symptoms to moderate symptoms are at low risk of experiencing stunting with normal baby weight and height indicators. The effect of exposure to Covid-19 during pregnancy on the risk of stunting based on the baby's weight and height according to the z-score has no effect. Confirmed status of Covid-19 during pregnancy on baby development, a comparison found deviations in baby development in mothers who were not infected and infected with Covid-19. There is a relationship between the confirmed status of Covid-19 during pregnancy and the development of the baby.

DECLARATION OF CONFLIC OF INTEREST

The researcher states that there is no conflict of interest in financial or personal relationships that might affect the completion of the articles presented in this manuscript.

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