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DETERMINANTS OF INTRAUTERINE GROWTH RESTRICTION (IUGR) IN LABOURING MOTHERS AT REGIONAL GENERAL HOSPITAL IN KARAWANG, WEST JAVA

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ABSTRACT

Introduction: Intrauterine Growth Restriction (IUGR) is a problem that continues to be challenging in the care of mothers and newborns. IUGR causes the baby's growth process to be stunted, and the baby is born with health problems. Many factors influence the incidence of IUGR, both modifiable and irreversible factors. This study aimed to determine the determinant factors for the incidence of IUGR in labouring mothers at the Karawang Regional General Hospital, West Java. **Method**: The research design used correlation analysis with a cross-sectional approach. The population in this study were labouring mothers at Karawang Hospital. The sampling technique used systematic random sampling. Bivariate analysis used the Chi-Square test. **Results:** The results showed that most of the prevalence of IUGR in labouring mothers was 68.8%. The results of the bivariate analysis showed that there was a significant relationship to the incidence of IUGR in labouring mothers, including age (p-value = 0.016; α <0.05), parity (p-value = 0.028; α <0.05), hypertension (p-value = 0.044; α <0.05), preeclampsia (p-value = 0.048; α <0.05), nutritional status (p-value = 0.026; α <0.05); anemia (p-value = 0.029; α <0.05); Gemelli pregnancy (p-value = 0.028; α <0.05). There was no significant relationship between history of heart disease and IUGR (p-value = 0.532; α <0.05). **Conclusion.** IUGR is a condition that causes fetal growth to be stunted. Several factors that affect IUGR include the age of the pregnancy, parity (multipara or grand multipara), hypertension as a comorbidity, preeclampsia, nutritional status of pregnancy, anemia during pregnancy, and multiple pregnancies. Some of these risk factors can be modified and prevented by pregnant women by carrying out routine checks.

Keywords

Intrauterine Growth Restriction, IUGR, Labouring Mothers

INTRODUCTION

Intrauterine Growth Restriction (IUGR) is a significant global public health problem and a major cause of infant mortality and morbidity. IUGR is one of the causes of death in children and perinatal, with the incidence varying between 3-10%. The perinatal mortality rate for infants with IUGR is approximately 7-8 times higher than normal infants, and around 26% of infants are stillborn with IUGR (Suryanti et al., 2020). BKKBN (2017) that the incidence of IUGR in Indonesia is 4.4% of all live births. Most children with LBW associated with IUGR were found in the provinces of Papua at 27%, East Nusa Tenggara at 20.3%, and South Sumatra at 19.5%. Indonesia's health profile (2021), it is reported that most infants are born with LBW 81.8%, and the prevalence of LBW infants caused by IUGR is 3.1%. The majority of IUGR in Karawang

Hospital in 2021 is 9.1%, and in 2022 it is 11%.

IUGR results from the interaction of various factors through a process that occurs in the pregnancy. According to The American College of Obstetricians and Gynecologists (ACOG), IUGR describes a fetus with an estimated weight below the 10th percentile for a certain gestational age (Sharma et al., 2016). The risk factors for IUGR are a young pregnant mother's age, primigravida status, low gestational weight gain, and history of abortion. Hypertension in pregnancy, abnormal uteroplacental vasculature, congenital abnormalities, infections, or substance abuse by pregnant women have been reported to be associated with the incidence of IUGR. In pregnancies with IUGR, termination is performed by ultrasound examination. Infants with IUGR are at risk for complications, such as preterm delivery, hypoglycemia, hypocalcemia, and thermoregulation disorders. Therefore, neonatal resuscitation and handling complications during labor must be done quickly and precisely (Kesavan & Devaskar, 2019).

The placenta plays an essential role in the occurrence of IUGR. The abnormal formation, inadequate perfusion, and dysfunction of the placental villi are among the leading causes of IUGR, especially in early gestation. The pathophysiology of IUGR is not known with certainty because fetal growth is a complex process involving many factors. Several factors that are thought to cause IUGR are abnormal placental function, inadequate maternal supply of oxygen and nutrition, and decreased ability to use supplies by the fetus (Sharma et al., 2016). Other causes of IUGR, including the history of diseases experienced by the mother, such as hypertension, preeclampsia, anemia, chronic energy deficiency, and maternal nutrition, have a strong influence (Zamecznik et al., 2014).

IUGR's prognosis impacts preterm delivery, perinatal asphyxia, thermoregulation disorders, and impaired immune function (Sharma et al., 2016). The long-term impact that will arise is cardiovascular diseases (CVD). This risk will increase if, in childhood, there is rapid weight gain or obesity. The physiological concept of relating intrauterine life processes to the consequences of later disease is known today as fetal programming. This concept was developed from the Fetal Origin Of Adult Disease (FOAD) hypothesis by Barker, or the Barker Hypothesis, a disease in adults that has been programmed since childhood (Malhotra et al., 2014).

Hospital efforts and the role of midwives are significant for the problem of IUGR. Preventive is the leading service in addition to promotive services that can be carried out in the midwifery realm, such as during Antenatal Care (ANC), carrying out routine ANC examinations that have been scheduled for at least six times during pregnancy, doing the ultrasound, examinations by doctors, counseling for nutrition during a healthy and nutritious pregnancy, accurate and periodic examination of the height of the uterine fundus during ANC visits is a way of early detection of the possibility of IUGR and other pregnancy problems. One of the midwives' authority in examinations during ANC is 12T, one of which is the TFU examination (RI, 2021). Based on the description above, the problem of intrauterine growth restriction (IUGR) is still relatively high and occurs globally and nationally. This study aimed to determine the determinant factors for the incidence of IUGR in labouring mothers at Karawang Hospital, West Java.

METHOD

The research design used correlation analysis with a cross-sectional approach. The population in this study were labouring mothers at Karawang Hospital. The sampling technique used systematic random sampling. Bivariate analysis used the Chi-Square test.

RESULTS

ANALYSIS UNIVARIATE

Table 1 The Frequency Distribution based on IUGR, Age, Parity, Hypertension, Preeclampsia, Nutritional Status, History of Heart Disease, Anemia, and Gemelli Pregnancies

Variable		n	%
IUGR	Yes	72	68.6
	No	33	31.4
Age	High Risk (<20 years or >35 years	37	35.2
	Not at risk (20-35 years)	68	64.8
Parity	Multipara or Grand Multipara	70	66.7
	Primipara	35	33.3
Hypertension	Yes	34	32.6
	No	71	67.6
Preeclampsia	Yes	38	36.2
	No	67	63.8
Nutritional Status	Normal	36	34.1
	Chronic Energy Deficiency	69	65.9
History of Heart Disease	Yes	59	56.2
	No	46	43.8
Anemia	Yes	39	37.1
	No	66	62.9
Gemelli Pregnancy	Yes	54	51.4
	No	51	48.6

The results based on Table 1 showed that most of the respondent's mothers experienced IUGR was 27 respondents (68.8%), most of the age respondents did not have high risk as many as 68 respondents (64.8%), the prevalence of respondents with multipara or grand multipara parity was 70 respondents (66.7%)), the prevalence of respondents who did not have hypertension was 71 respondents (67.6%), the majority of respondents who did not have preeclampsia was 67 respondents (63.8%), the prevalence of nutritional status of respondents with chronic energy deficiency was 69 respondents (65.9%), the majority of respondents who had a history of heart disease was 59 respondents (56.2%), the prevalence of respondents who did not have anemia was 66 respondents (62.9%), and the majority of respondents with Gemelli pregnancy was 54 respondents (51.4%).

Table 2 Bivariate Analysis

Variable		IUGR				P-value	OR (95% CI)
		Yes		No			
		n	%	n	%		
Age	High Risk (<20 years or >35 years	31	43.0	6	18.2	0.016*	3.4 (1.3-9.3)
	Not at risk (20-35 years)	41	57.0	27	81.8		
Total		72	68.6	33	31.4		
Parity	Multipara or Grand Multipara	43	59.7	27	81.8	0.028*	3.0 (1.1-8.3)
	Primipara	29	40.3	6	18.2		
Total		72	68.6	33	31.4		
Hypertension	Yes	28	38.9	6	18.2	0.044*	2.9 (1.0-7.8)
	No	44	61.1	27	81.8		
Total		72	68.6	33	31.4		
Preeclampsia	Yes	31	43.0	7	21.2	0.048*	2.8 (1.1-7.3)
	No	41	57.0	26	78.8		
Total		72	68.6	33	31.4		
Nutritional Status	Normal	42	58.3	27	81.8	0.026*	3.2 (1.2-8.7)
	Chronic Energy Deficiency	30	41.7	6	18.2		
Total		72	68.6	33	31.4		
History of Heart Disease	Yes	42	58.3	17	51.5	0.532	-
	No	30	41.7	16	48.5		
Total		72	68.6	33	31.4		
Anemia	Yes	32	44.4	7	21.2	0.029*	2.9 (1.1-7.7)
	No	40	55.6	26	78.8		
Total		72	68.6	33	31.4		
Gemelli Pregnancy	Yes	29	40.3	6	18.2	0.028*	3.0 (1.1-8.3)
	No	43	59.7	27	81.8		
Total		72	68.6	33	31.4		

*Significant at p-*value* <0.05

Bivariate Analysis

Age with Incidence of IUGR

The analysis showed a significant relationship between age and the incidence of IUGR (p-value = 0.016; OR 3.4; 95% CI: 1.3-9.3). Not at-risk (20-35 years old) labouring mothers had a 3.4 times chance of experiencing IUGR than those at risk.

Parity with Incidence of IUGR

The analysis showed a significant relationship between parity and the incidence of IUGR (p-value = 0.028; α <0.05; OR 3.0; 95% CI: 1.1-8.3). The labouring mothers with multiparas or grand multiparas were at risk of experiencing IUGR 3.0 times compared to primiparas.

Hypertension with Incidence of IUGR

The analysis showed a significant relationship between hypertension and the incidence of IUGR (p-value = 0.044; α <0.05; OR 2.9; 95% CI: 1.0-7.8). The labouring mothers who did not have hypertension were at risk of 3.0 times experiencing IUGR than mothers with hypertension.

Preeclampsia with Incidence of IUGR

The analysis showed a significant relationship between preeclampsia and the incidence of IUGR (p-value = 0.048; α <0.05; OR 2.8; 95% CI: 1.1-7.3). The labouring mothers who did not have preeclampsia were at risk of 3.8 times experiencing IUGR than mothers with eclampsia.

Nutritional Status with Incidence of IUGR

The analysis showed a significant relationship between nutritional status and the incidence of IUGR (p-value = 0.026; α <0.05; OR 3.2; 95% CI: 1.2-8.7). The labouring mothers with normal nutritional status were at risk of 3.2 times experiencing IUGR than mothers with chronic energy deficiency.

History of Heart Disease with Incidence of IUGR

The analysis showed no significant relationship between the history of heart disease and the incidence of IUGR (p-value = 0.532; α <0.05).

Anaemia with Incidence of IUGR

The analysis showed a significant relationship between anemia and the incidence of IUGR (p-value = 0.029; α <0.05; OR 2.9; 95% CI: 1.1-7.7). The labouring mothers who did not have anemia were at risk of 2.9 times experiencing IUGR than mothers with anemia.

Gemelli Pregnancy with Incidence of IUGR

The analysis showed a significant relationship between Gemelli pregnancy and the incidence of IUGR (p-value = 0.028; α <0.05; OR 3.0; 95% CI: 1.1-8.3). The labouring mothers who did not have Gemelli pregnancy were at risk 3.0 times experiencing IUGR than mothers with Gemelli mothers.

DISCUSSION

Intrauterine Growth Restriction

Based on the study's results, most labouring mothers experienced an IUGR of 68.6%. The study is in line with the research of Suryanti et al (2020), most labouring mothers experience an IUGR of 65%. This research is reinforced by Irwantoro et al. (2021), the prevalence of IUGR in pregnant women is 76,16%. Researchers assume that IUGR is a condition in which the fetus fails to reach its growth potential, characterized by an estimated weight less than the 10th percentile for gestational age. Risk factors need to be identified to assist in the antenatal diagnosis of IUGR and increase the mother's knowledge by explaining the risk factors involved so that they can be avoided to minimize the occurrence of IUGR (Kurniasari & Arifandini, 2019).

Factors Associated between Age and the Incidence of IUGR

The research results showed a significant relationship between age and the incidence of IUGR. The prevalence of IUGR based on age is mostly in non-risk birth mothers (20-35 years) of 50.7%. The incidence of IUGR with reproductive age is still a lot that is stunted fetal growth could be caused by other factors such as maternal disease. In general, mothers with morbidities, including cardiovascular disease, metabolic disease, and infections, have a greater risk of having an infant with IUGR (Irwantoro et al., 2021; Prawiroharrdjo, 2021).

Factors Associated between Parity and the Incidence of IUGR

The results showed a significant relationship between parity and the incidence of IUGR. The prevalence of IUGR events based on parity is mostly in multipara or grand multipara births at 59.7%. Parity is the condition of a mother who gives birth to more than one fetus. Mothers with parity >3 are at risk of

experiencing IUGR compared to mothers with parity 1-3. Mothers with multiparas can experience disorders or abnormalities in the placenta, including placental insufficiency, which can increase the risk of IUGR. Multipara parity or grandemultipara have a risk of IUGR. The more often mothers give birth, the more disorders or irregularities in the placenta will occur (Kurniasari & Arifandini, 2019; Tesfa et al., 2020).

Factors Associated between Hypertension and the Incidence of IUGR

The results showed a significant relationship between hypertension and the incidence of IUGR. This is in line with the research of Irwantoro et al (2021), there is an essential relationship between hypertension and IUGR (p-value = 0.000; α <0.05). Hypertension is one of the comorbidities in pregnant women. The condition of the blood vessels during pregnancy causes spasms of the blood vessels, and in some cases, there is a narrowing of the lumen of the arterioles, which can inhibit the growth of the fetus. Hypertension during pregnancy can cause impaired blood flow to the placenta so that nutrients from mother to fetus are reduced. Chronic and Gestational Hypertension in pregnancy affects fetal growth, both of which are the cause of stunted fetal development or the incidence of IUGR (Kamilah & Ningrum, 2020).

Factors Associated between Preeclampsia and the Incidence of IUGR

The results showed a significant relationship between preeclampsia and the incidence of IUGR. This is in line with the research of Irwantoro et al (2021), there is a significant relationship between preeclampsia and IUGR (p-value = 0.000; α <0.05). Preeclampsia is one of the causes of IUGR. In preeclampsia, there is a spasm of the decidual spiral arterioles, which causes decreased blood flow to the placenta. Reduced blood flow to the placenta will result in impaired placenta function in the form of placental hypoxia. Preeclampsia is a pregnancy-specific syndrome in the form of reduced organ perfusion due to vasospasm and endothelial activity. Proteinuria is an essential sign of preeclampsia (Tesfa et al., 2020).

Factors Associated between Nutritional Status and the Incidence of IUGR

The results showed a significant relationship between nutritional status and the incidence of IUGR. This is in line with the research of Suryanti et al (2020), there is a significant relationship between preeclampsia and IUGR (p-value = 0.000; α <0.05). A low body mass index of pregnant women tends not to fulfill adequate nutritional needs for fetal growth, which will impact the baby's birth weight. Pregnant women with average or low body weight and lack of weight gain during pregnancy can cause stunted fetal growth. Lack of weight gain in the second trimester strongly correlates with decreased birth weight. Poor nutritional status in pregnant women will cause the risk of IUGR in their fetuses to be 2-3 times greater than mothers who have good nutritional status (Astuti et al., 2020; Cetin et al., 2013; Tesfa et al., 2020).

Factors Associated between History of Heart Disease and the Incidence of IUGR

The results showed no significant relationship between a history of heart disease and the incidence of IUGR. This is not in line with the research of Suryanti et al (2020), there is a significant relationship between heart disease and IUGR (p-value = 0.003; α <0.05). Cardiovascular disease can disrupt the uteroplacental flow, so the fetus's needs cannot be adequately met. Besides, with an infection, the metabolic needs of the mother will increase so that the mother's body cannot meet the metabolic needs of the fetus. If these two processes last long, they can trigger IUGR (Crispi et al., 2018).

Factors Associated between Anaemia and the Incidence of IUGR

The results showed a significant relationship between anemia and the incidence of IUGR. This is in line with the research of Suryanti et al (2020), where there is a significant relationship between anemia and IUGR (p-value = 0.000; α <0.05). Anemia during pregnancy can affect both the mother and the fetus. The fetus can experience intrauterine growth disorders or IUGR, increasing the risk of having a low birth weight baby. Reduced hemoglobin levels to bind oxygen can indirectly affect the mother and infant, including stunted fetal growth (IUGR). Meanwhile, mothers may experience an increased risk of bleeding before and during delivery. Even anemia can cause death for the mother and her baby if the pregnant woman suffers from severe anemia (Edelson et al., 2023) (Edelson et al., 2023).

Factors Associated between Gemelli and the Incidence of IUGR

The results showed a significant relationship between anemia and the incidence of IUGR. This is in line with the research of Wu et al (2016), where there is a significant relationship between Gemelli and IUGR (p-value <0.05; α <0.05). Gemelli pregnancy is a pregnancy that consists of two fetuses in the womb at the same time. Gemelli pregnancies are more risky than singleton pregnancies. Gemelli pregnancies have significant risks to the mother, such as miscarriage, anemia, gestational diabetes mellitus, and preeclampsia, and threats to the infant, such as premature birth, low birth weight, IUGR, and congenital abnormalities. In Gemelli pregnancies, excessive uterine distension occurs, thus exceeding the tolerance limit. Fetal weight in twin pregnancies is smaller than the fetus in single pregnancies at the same gestational age. This is because excessive stretching causes reduced blood circulation and oxygenation to the fetus (Puccio et al., 2013; Saffira et al., 2020).

CONCLUSION

Intrauterine Growth Restriction (IUGR) is a condition that causes fetal growth to be stunted. Several factors that affect IUGR include the age of the pregnancy, parity (multipara or grand multipara), hypertension as a comorbidity, preeclampsia, nutritional status of pregnancy, anemia during pregnancy, and multiple pregnancies. Some of these risk factors can be modified and prevented by pregnant women by carrying out routine checks.

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