Maternal age and parity associated with low birth weight infants

Edad materna y parto asociados con infantes con bajo peso al nacer

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SUMMARY

Introduction: *Low birth weight (LBW) infants indicate infant morbidity and infant mortality rates. In Indonesia, the infant mortality rate is still very high, with 32 deaths per 1 000 live births. The purpose of this study is to prove a relationship between maternal age and parity with LBW infants.*
Methods: *This study used an observational cross-section study design. The sample selection used total sampling with a sample of 117 samples. The sample was collected from the medical record of Muhammadiyah Hospital of Surabaya for 12 months in 2018.*
Results: *There were 74 mothers (63.2 %) of at-risk age, and 110 mothers (94 %) had risk parity. There was a significant effect of maternal age on infant birth weight (p=0.000). Mothers with a risk age increased the tendency to give birth to LBW infants by 52.720 times. There was a significant effect of maternal parity on infant birth weight (p=0.014). Mothers with parity at risk increased the likelihood of giving birth to infants with LBW by 36.856 times. The formula predicts the occurrence of LBW is equal with -11.126+3.965*Age+3.607*Parity.*
Conclusion: *Maternal age and parity were associated with LBW infants.*

Keywords: *Low birth weight, age, parity, maternal.*

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RESUMEN

Introducción: *Los lactantes con bajo peso al nacer (BPN) indican tasas de morbilidad y mortalidad infantil. En Indonesia, la tasa de mortalidad infantil sigue siendo muy alta, con 32 muertes por cada 1 000 nacidos vivos. El propósito de este estudio es probar una relación entre la edad materna y la paridad con los bebés de bajo peso al nacer.*

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Métodos: *Este estudio utilizó un diseño de estudio observacional de corte transversal. La selección de la muestra utilizó un muestreo total con una muestra de 117 muestras. La muestra se tomó del expediente médico del Hospital Muhammadiyah de Surabaya durante 12 meses en 2018.*

Resultados: *Había 74 madres (63,2 %) en edad de riesgo y 110 madres (94 %) tenían paridad de riesgo. Hubo un efecto significativo de la edad materna sobre el peso al nacer del bebé (p=0,000). Las madres con edad de riesgo incrementaron la tendencia a dar a luz a bebés de bajo peso al nacer en 52 720 veces. Hubo un efecto significativo de la paridad materna sobre el peso al nacer del bebé (p=0,014). Las madres con paridad en riesgo aumentaron la probabilidad de dar a luz a bebés con BPN en 36 856 veces. La fórmula predice que la ocurrencia de BPN es igual a -11 126 + 3 965 * Edad + 3 607 * Paridad.*

Conclusión: *La edad materna y la paridad se asociaron con los lactantes de bajo peso al nacer.*

Palabras clave: *Bajo peso al nacer, edad, paridad, materno.*

INTRODUCTION

The infant mortality rate in Indonesia is still very high compared to other developing countries based on the 2013 Central Bureau of Statistics. Infant Mortality Rate in Indonesia reached 32 deaths per 1 000 live births in 2013, making Indonesia one of the countries with the highest IMR in ASEAN (1). One of the causes of infant mortality in Indonesia is low birth weight (LBW) infants of 38.85 %. The following year the Sustainable Development Goals (SDGs) were used until 2030, namely by reducing the maternal and infant mortality rates by 12 per 1 000 live births (2). The purpose of the SDGs is implemented in East Java Province, Indonesia, by implementing 4 per 1 000 live births to improve health even better and reflect superior health (1).

LBW are newborns born weighing <2,500 grams without assessing gestation (3). LBW infants are very susceptible to illness (4). In 1961 by the World Health Organization (WHO), all infants born with fewer than 2,500 grams were called LBW Infants. Many still think that LBW only occurs in premature infants or infants who are not full-term. However, LBW can not only occur in premature infants. It can also occur

in term infants who experience a process of inhibition in their growth during pregnancy (1). LBW is caused by multifactorial factors such as maternal factors, placental factors, fetal factors, and environmental factors (5). LBW is mostly found because the mother's age is not ready to conceive during pregnancy (6,7). Maternal age at pregnancy is also related to a woman's age at marriage. Women who marry at an early age have the opportunity to get pregnant at a young age, too (8). Previous studies also report that LBW may be caused by malaria during pregnancy (9,10).

The clinical manifestations of LBW can be divided based on prematurity and immaturity. Clinical manifestations of prematurity are: birth weight <2,500 grams, body length <45 cm, chest circumference <30 cm, and head circumference <33 cm. The period of gestation is less than 37 weeks. It is thin and shiny skin, less subcutaneous fat, very soft ear cartilage, lots of lanugo, especially in the dorsal region, the blood vessels of the skin are still visible, and the nipples have not been properly developed. In the labia majora of female sex infants, the labia minora cannot close. In comparison, the testes have not decreased in male infants. Other manifestations are lack of movement, weakness, and muscle tone are hypotonic, weeping and sluggish, and breathing is not normal, repeated apnea attacks, neck tonic reflexes are still weak, suck and swallow reflexes have not reached perfect levels (11).

Apart from prematurity, there is also immaturity. The clinical manifestations of immaturity are as follows: pale skin, such as blemishes, meconium or dry, wrinkled, and thin stools, thin or absent vernix caseosa, thin fatty tissue under the skin, the baby looks fast, active and healthy, the umbilical cord is slightly greenish-yellow (11). Other factors can also be obtained from the maternal parity factor that occurs during childbirth. Besides, mothers must also pay more attention to adequate nutrition to meet the needs of mothers and infants who can be born with sufficient weight (6). Based on this background, this study aims to determine the relationship between maternal age and parity with LBW infants.

METHODS

An observational cross-sectional approach was used in this analysis. This research used the information to test a correlation study's design between two variables from a sample group. The independent variable was LBW infant, and the dependent variable was the age of the baby's mother and their parity. The research instrument is secondary data obtained from mothers who give birth and infants born in Muhammadiyah Surabaya Hospital, Indonesia, as long as 12 months of the year 2018. The data collected with consecutive criteria of as many as 117 samples. The inclusion criteria were complete medical records, pregnancy over 20 weeks, normal parturient, the parturient distance over two years, no chronic illness, no history of pre-eclampsia and pre-during-postpartum bleeding, no substance abuse, no smoking, no alcohol use, no history of infection during pregnancy, and regular antenatal care. The exclusion criterion was the cesarean section in a parturient. The data obtained were then processed using the statistical analysis technique of the Chi-Square correlation coefficient test.

RESULTS

The total sample of LBW infants whose mothers had normal parturient in the medical record was 117 samples within a year. Table 1 shows that the majority of mother in this study was at risk age. Most infants' weight was included in the LBW group. Table 1 shows that there is a respondent with a risk age, namely those aged <20 or >35 years. The respondents who were not at risk were in the 20-35 age group.

Furthermore, it can be seen that there was a respondent with risk parity, namely parity 1 or ≥4. The number of respondents with no risk parity, 2-3, was 6.0 %. Also, it can be seen that the number of respondents with LBW infants, namely <2,500 grams, was 73.5 %. The number of respondents with average baby weight, average birth weight (ABW), namely ≥2,500 grams, was 26.5 %. The minimum mother's age was 18 years, and the maximum was 44 years. The mother's minimum parity was 0, the maximum was 5, and the average was 1.04. For infants, the minimum birth weight was 2,200 grams; 2,500 grams was the maximum.

Table 1

Distribution of Respondents

Variable	Description	N (%)	Mean	SD	Min	Max
Mother's age (years)	At risk (<20 & >35)	74 (63.2)	31.4	7.8	18	44
	Not at risk (20-35)	43 (36.8)				
Mother's parity	At-risk (1 or ≥ 4)	110 (94)	1.0	1.4	0	5
	Not at risk (2-3)	7 (6)				
Baby Weight	LBW	86 (73.5)	2,407.7	79.0	2,200	2,500
	ABW	31 (26.5)				

LBW: Low birth weight
ABW: average birth weight

Bivariate analysis showed that the mother's age at risk (p=0.000) and mother's parity (p=0.014) were significantly associated with LBW. The result of the correlation of maternal age and parity to LBW infants can be seen in Table 2. It obtained a formula to predict the occurrence of LBW infants. The Nagelkerke R-Square value was 0.568, indicating that the independent variable's ability to explain the dependent variable was 56.8 %. There were 100 % - 56.8 % = 43.2 % other factors outside the model that explained the dependent variable. This test determined each

independent variable's effect (mother's age and parity) on the dependent variable (LBW). Based on the results of the logistic regression test from Table 2, the regression equation obtained is as follows to predict the occurrence of LBW infant: LBW= -11 126+3 965*Age+3 607*Parity.

Table 2

Relationship between maternal age and parity to LBW

	b	Wald	p	OR	95 %	CI
Age	3.965	25.630	0.000	52.720	11.359	244.696
Parity	3.607	9.183	0.002	36.856	3.575	379.923
Constant	-11.126	22.456	0.000	0.000		

Nagelkerke R squere = 56.8%; Hosmer & Lemeshow test = 0.948

DISCUSSION

This study proves that maternal age and maternal parity were associated with LBW. The maternal age had a risk of 52.720 times for the occurrence of LBW. Besides, maternal parity had risks 36.856 times higher of giving birth to an LBW. It is in line with a study in South Korea that found maternal age and parity contribute 79 % of LBW (12). Another study also found that grand multiparous women contribute 3.89 times LBW compared to multiparous women. Nulliparous women 0.23 times compared to multiparous women. Primiparous women contribute 0.22 times compared to multiparous women. Women aged 40 and above contribute 1.96 times compared to women aged 30-34 (13). Our study had different results from this study; contrary, maternal parity had a more significant effect than maternal age. Another study divided the parity into three groups, including grande multiparous, multiparous, and nulliparous (13), while our study only divided into two groups, not at-risk (multiparous, 2-3) and at-risk (nulliparous and grande multiparous, ≥4). In addition, maternal age >35 years also can interfere with circulation in the uterine organs during pregnancy. Circulatory disorders in pregnant women can lead to LBW infants and the occurrence of preeclampsia (14).

Maternal age will influence mothers to give birth to LBW infants. When the mother is <20 years of age, the reproductive organs and physiological functions are not yet optimal; besides, their emotions and psychology are not mature enough to prevent the mother from reacting correctly to her pregnancy during pregnancy (15). Meanwhile, pregnancies above 35 years of age are also not recommended, considering that diseases such as hypertension, benign tumors, and other degenerative diseases often appear (16). The previous report revealed that the age factor affected 1.7 times the occurrence of LBW (17). A study also shows maternal age had a significant effect on the occurrence of LBW (18). The incidence rates of adverse infant outcomes began to increase at the maternal age of 30 years. The maternal age of ≥35 years was associated with significantly increased risks of adverse infant outcomes, including small for gestational age 1.15 times, LBW 1.29 times, and preterm birth 1.17 times (19).

Mothers who have given birth to children more than three times are at risk of giving birth to LBW infants. Other studies show that parity has four times the risk of LBW (17,20). Another report also found that maternal age had a significant effect on LBW occurrence (18). This condition is because the uterus is usually weak due to decreased reproductive organs, so that muscle cells begin to weaken and other body parts have decreased to cause an increase in LBW incident. The results showed that parity is a high-risk factor for LBW, where mothers with parity >3 children will be at risk of giving birth to LBW twice (15).

This study demonstrated that mothers with high parity can influence mothers to give birth to LBW infants because repeated pregnancies will damage the uterine blood vessels' walls. This condition will affect nutrition to the fetus in subsequent pregnancies to cause fetal growth disorders. Who, in turn, will give birth to a baby with LBW. Other factors associated with LBW incidence in newborns are anemia (21), a history of LBW in previous labor, and placenta previa (22).

CONCLUSION

There was a significant effect of maternal age and parity on the birth weight of infants. Mothers with a risk age and parity increased the tendency to give an LBW of their infants by 52.720 and 36.856 times, respectively.

Acknowledgments

Conflicts of Interest

The authors declare no conflict of interest.

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