

Maternal Age and Parity Associated with Low Birth Weight Infants

by Muhammad Anas Dosen Fk

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1 **Maternal Age and Parity Associated with Low Birth Weight Infants**

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5 Intan Afifah¹, Ninuk Dwi Ariningtyas², Gina Noor Djalilah³, Muhammad Anas^{2*}

6 ¹Faculty of Medicine, University of Muhammadiyah Surabaya, Surabaya, East Java, 60113,
7 Indonesia

8 ²Department of Obstetric Gynecology, Faculty of Medicine, University of Muhammadiyah
9 Surabaya, Surabaya, East Java, 60113, Indonesia

10 ³Departemen Pediatric, Faculty of Medicine, University Muhammadiyah of Surabaya,
11 Surabaya, East Java, 60113, Indonesia

12

13 **Corresponding Author:**

14 Muhammad Anas, MD, PhD

15 Department of Obstetric Gynecology, Faculty of Medicine, University Muhammadiyah of
16 Surabaya, Surabaya, East Java, 60113, Indonesia

17 Sutorejo Road 59 Surabaya, East Java, 60113, Indonesia

18 Tel +62313811966

19 Fax +62313813096

20 Email: muhanasjamil1@yahoo.co.id

1 **ABSTRACT**

2 **Introduction:** Low birth weight (LBW) infants indicate infant morbidity and infant mortality
3 rates. In Indonesia, the infant mortality rate is still very high, with 32 deaths per 1000 live births.

4 **The purpose of this study** is to prove a relationship between maternal age and parity with LBW
5 infants.

6 **Methods:** This study used an observational cross-section study design. The sample selection used
7 total sampling with a sample of 117 samples. The sample was collected from the medical record of
8 Muhammadiyah Hospital of Surabaya for 12 months in 2018.

9 **Results:** There were 74 mothers (63.2%) of at-risk age, and 110 mothers (94%) had risk
10 parity. There was a significant effect of maternal age on infant birth weight ($p=0.000$). Mothers
11 with a risk age increased the tendency to give birth to LBW infants by 52.720 times. There was
12 a significant effect of maternal parity on infant birth weight ($p=0.014$). Mothers with parity at
13 risk increased the likelihood of giving birth to infants with LBW by 36.856 times. The formula
14 predicts the occurrence of LBW is equal with $-11.126+3.965*Age+3.607*Parity$.

15 **Conclusion:** Maternal age and parity were associated with LBW infants.

16

17 **Keywords:** Low Birth Weight; Age; Parity; Maternal

1 **INTRODUCTION**

2 ¹⁹ The infant mortality rate in Indonesia is still very high compared to other developing
3 countries based on the 2013 Central Bureau of Statistics. Infant Mortality Rate in Indonesia
4 reached 32 deaths per 1000 live births in 2013, making Indonesia one of the countries with
5 the highest IMR in ASEAN (1). ¹ One of the causes of infant mortality in Indonesia is low
6 birth weight (LBW) infants of 38.85%. The following year the Sustainable Development
7 Goals (SDGs) were used until 2030, namely by reducing the maternal and infant mortality
8 rates by 12 per 1000 live births (2). The purpose of the SDGs is implemented in East Java
9 Province, Indonesia, by implementing 4 per 1,000 live births to improve health even better
10 and reflect superior health (1).

11 LBW are newborns born weighing <2,500 grams without assessing gestation (3).
12 LBW infants are very susceptible to illness (4). In 1961 by the World Health Organization
13 (WHO), all infants born with fewer than 2,500 grams were called LBW Infants. Many still
14 think that LBW only occurs in premature infants or infants who are not full-term. However,
15 LBW can not only occur in premature ²⁵ infants. It can also occur in term infants who
16 experience a process of inhibition in their growth during pregnancy (1). LBW is caused by
17 multifactorial factors such as ⁸ maternal factors, placental factors, fetal factors, and
18 environmental factors (5). LBW is mostly found because the mother's age is not ready to
19 conceive during pregnancy (6,7). Maternal age at pregnancy is also related to a woman's age
20 at marriage. Women who marry at an early age have the opportunity to get pregnant at a
21 young age, too (8). Previous studies also report that LBW may be caused by malaria during
22 pregnancy (9,10).

23 The clinical manifestations of LBW can be divided based on prematurity and
24 immaturity. Clinical manifestations of prematurity are: birth weight <2,500 grams, body

25 length <45 cm, chest circumference <30 cm, and head circumference <33 cm. The period of
26 gestation is less than 37 weeks. It is thin and shiny skin, less subcutaneous fat, very soft ear
27 cartilage, lots of lanugo, especially in the dorsal region, the blood vessels of the skin are still
28 visible, and the nipples have not been properly developed. In the labia majora of female sex
29 infants, the labia minora cannot close. In comparison, the testes have not decreased in male
30 infants. Other manifestations are lack of movement, weakness, and muscle tone are
31 hypotonic, weeping and sluggish, and breathing is not normal, repeated apnea attacks, neck
32 tonic reflexes are still weak, suck and swallow reflexes have not reached perfect levels (11).

33 Apart from prematurity, there is also immaturity. The clinical manifestations of
34 immaturity are as follows: pale skin, such as blemishes, meconium or dry, wrinkled, and thin
35 stools, thin or absent vernix caseosa, thin fatty tissue under the skin, the baby looks fast,
36 active and healthy, the umbilical cord is slightly greenish-yellow (11). Other factors can also
37 be obtained from the maternal parity factor that occurs during childbirth. Besides, mothers
38 must also pay more attention to adequate nutrition to meet the needs of mothers and infants
39 who can be born with sufficient weight (6). Based on this background, ²² this study aims to
40 determine the relationship between maternal age and parity with LBW infants.

1 **METHODS**

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

1 **RESULTS**

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

7 Furthermore, it can be seen that there was a respondent with risk parity, namely parity
8 1 or ≥ 4 . The number of respondents with no risk parity, 2-3, was 6.0%. Also, it can be seen
9 that the number of respondents with LBW infants, namely <2,500 grams, was 73.5%. The
10 number of respondents with average baby weight, average birth weight (ABW), namely
11 $\geq 2,500$ grams, was 26.5%. The minimum mother's age was 18 years, and the maximum was
12 44 years. The mother's minimum parity was 0, the maximum was 5, and the average was
13 1.04. For infants, the minimum birth weight was 2,200 grams; 2,500 grams was the
14 maximum.

15
16 **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

17

18 Bivariate analysis showed that the mother's age at risk ($p=0.000$) and mother's parity
19 ($p=0.014$) were significantly associated with LBW. The result of the correlation of maternal
20 age and parity to LBW infant can be seen in Table 2. It obtained a formula to predict the
21 occurrence of LBW infants. The Nagelkerke R-Square value was 0.568, indicating that the
22 independent variable's ability to explain the dependent variable was 56.8%. There were
23 $100\% - 56.8\% = 43.2\%$ other factors outside the model that explained the dependent variable.
24 This test determined each independent variable's effect (mother's age and parity) on the
25 dependent variable (LBW). Based on the results of the logistic regression test from Table 2,
26 the regression equation obtained is as follows to predict the occurrence of LBW infant:
27 $LBW = -11.126 + 3.965 * Age + 3.607 * Parity$.

28

29 **Table 2.** Relationship between Maternal Age and Parity to LBW

	<i>b</i>	Wald	<i>p</i>	OR	95% CI	
Age	3.965	25.630	0.000	52.720	11.359 - 244.696	30
Parity	3.607	9.183	0.002	36.856	3.575 - 379.923	31
Constant	-11.126	22.456	0.000	0.000		32
Nagelkerke R square = 56.8%; Hosmer & Lemeshow test = 0.948						33

34

35

1 **DISCUSSION**

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

17 Maternal age will influence mothers to give birth to LBW infants. When the mother is
18 <20 years of age, the ³reproductive organs and physiological functions are not yet optimal;
19 besides, their emotions and psychology are not mature enough to prevent the mother from
20 reacting correctly to her pregnancy during pregnancy (15). Meanwhile, pregnancies above 35
21 years of age are also not recommended, considering that diseases such as hypertension,
22 benign tumors, and other degenerative diseases often appear (16). The previous report
23 revealed that the age factor affected 1.7 times the occurrence of LBW (17). A study also
24 shows ⁵maternal age had a significant effect on ⁵the occurrence of LBW (18). ⁵The incidence

25 rates of adverse infant outcomes began to increase at a maternal age of 30 years. The
26 maternal age of ≥ 35 years was associated with significantly increased risks of adverse infant
27 outcomes, including small for gestational age 1.15 times, LBW 1.29 times, and preterm birth
28 1.17 times (19).

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

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

42

43 CONCLUSION

44 There was a significant effect of maternal age and parity on the birth weight of infants.
45 Mothers with a risk age and parity increased the tendency to give a LBW of their infants by
46 52.720 and 36.856 times, respectively.

47

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53 **Conflicts of Interest**

54 The authors declare no conflict of interest.

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