

Relationship Between Mother's Age, Gestational Weight Gain and Pre Pregnancy Body Mass Index Among Low Birth Weight

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Abstract

In Indonesia, the prevalence of low birth weight infants get up to 10.2%. Low birth weight is pregnancy outcomes that could be influenced by maternal factors. Mother's age, gestational weight gain, and pre pregnancy body mass index is the internal factors of mothers. Mother is the subject of the pregnancy process. This study aims to determine the relationship between maternal age, weight gain during pregnancy and body mass index of pregnant with low birth weight incidence. The research was conducted in the working area of "Puskesmas Gading Surabaya". Analytic observational research design with case control approach. Sampling technique for case group using total sampling and control groups using simple random sampling. Sample consist of 18 respondents for case group dan 36 respondents for control group. Bivariable analyzes show that gestational weight gain and pre pregnancy body mass index significantly has a relationship with low birth weight ($p < 0.25$). Multivariable analysis using multiple logistic regression showed results: gestational weigh gain ($p = 0,010$; $OR = 0,144$), and pre pregnancy body mass index ($p = 0,014$; $OR = 7,433$). The research conclusion was from multivariable analysis, gestational weight gain and pre pregnancy BMI have a meaningful relationship with low birth weight.

Keywords: Gestational weigh gain, Pre pregnancy BMI, Low birth weight

I. INTRODUCTION

Low birth weight is public health problem that still occur in many countries including Indonesia. Low birth weight is considered to be one of the factors causing infant mortality (WHO, 2015). Low birth weight is a public health problem that can not be overcome yet in many developing countries (Pojda&Kelley, 2000). Globally, more than 20 million babies are born with low birth weight (WHO, 2004). According to Riskesdas data in 2013, the prevalence of low birth weight infants in Indonesia is 10.2% with the highest percentage being found in Central Sulawesi province.

Marital status in women aged 15-18 years reached a 12.8% percentage in Indonesia (Demographic Survey and Population of Indonesia, 2012). Marriage is the beginning of a preconception period, where sexual intercourse is done after a marriage. Based on data from SDKI 2012, 6.927 women gave birth to the first child at the age of 18-19 years. Mother's age below 20 years and over 35 years old is age at risk of pregnancy and delivery problem. If the mother does not planned for pregnancy at the right age then it will be at risk of pregnancy and delivery problem.

According to Riskesdas 2013, the prevalence of adult female obesity (> 18 years) was 32.9 percent, up 18,1 percent from 2007 (13,9 percent) and 17,5 percent from 2010 (15,5 percent). Body mass index values describe the nutritional status of women. Most women during adulthood plan for pregnancy. During the preconception period, the status of female adult BMI varies from underweight to obese. Based on some previous studies, body mass index before pregnancy can affect the anthropometric size of the infants.

Weight gain is a natural occurrence in pregnancy. During pregnancy, weight gain is not only caused by fat deposits, but also due to fetal growth, the weight of the uterus, placenta, blood volume, amniotic fluid, fluid in the maternal tissues, and the enlargement of breasts (Mintarsih, 2008). Previous research has shown that weight gain during pregnancy affects anthropometric size of infants at birth.

Mother is the subject of the pregnancy process. It is important to know the factors of influential mother in pregnancy. Therefore, this study aims to determine the relationship between maternal age, weight gain during pregnancy and body mass index of pregnant with low birth weight incidence.

II. METHODS

The type of this research was observational analytic using case control approach This research was conducted in May - June 2017 in the working area of Puskesmas Gading, Surabaya. Population in this research were post partum mothers who have babies age 0 to 4 months and attending antenatal care in Puskesmas Gading Surabaya. A total of 18 cases and 36 controls were selected in this study. Determination of sample size in case group using total sampling method and in control group using simple random sampling method.

The operational definition of research variables is described as follows:

1. Mother's age: mother's age at delivery

Grouped into:

- a. At risk age (mothers who gave birth at <20 or > 35 years old).
- b. Not at risk age (mothers who gave birth at 20-35 years old).

Category of mother's age is based on "Peraturan Menteri Kesehatan Republik Indonesia No 97 tahun 2014 tentang Pelayanan Kesehatan Kehamilan".

2. Gestational weight gain

Grouped into:

- a. Inappropriate: Mothers who gained weight during pregnancy not in accordance with the recommendations.
- b. Appropriate: Mothers who gained weight during pregnancy in accordance with the recommendations.

Determination of inappropriate and appropriate gestational weight gain were refer to normal weight gain according to body mass index before pregnancy. Gestational weight gain was based on Institute of Medicine recommendations.

i. Underweight:

mothers gained inappropriate weight gain if total weight gain during pregnancy under 12,5 kg or up to 18 kg. Mothers gained appropriate weight gain if total weight gain during pregnancy around 12,5kg to 18 kg.

ii. Normalweight:

mothers gained inappropriate weight gain if total weight gain during pregnancy under 11 kg or up to 16 kg. Mothers gained appropriate weight gain if total weight gain during pregnancy around 11 kg to 16 kg.

iii. Overweight:

mothers gained inappropriate weight gain if total weight gain during pregnancy under 7 kg or up to 11 kg. Mothers gained appropriate weight gain if total weight gain during pregnancy around 7 kg to 11 kg.

iv. Obese:

mothers gained inappropriate weight gain if total weight gain during pregnancy under 5 kg or up to 9 kg. Mothers gained appropriate weight gain if total weight gain during pregnancy around 5 kg to 9 kg.

3. Pre pregnancy Body Mass Index: a weight-to-height ratio, calculated by dividing mother's weight in kilograms by the square of mother's height in meters. Mother's weight calculated is weight before pregnancy. Mother's categorized by underweight if bmi value before pregnancy were under 18,5, normalweight if BMI value were 18,5 to 24,9, overweight if BMI value were 25 to 29,9 and obese if BMI value up to 30.

Method of data collection using secondary data collected from "Buku Kesehatan Ibu dan Anak". Bivariable analyzes used a chi-square test used to select candidates for influencing factors. Furthermore, multivariable analysis will be used to look at the most influential variables on low birth weight, using multiple logistic regression test.

III. RESULTS

The description of research results can be seen in table 1 below:

Table 1. Distribution of Mother's age, Gestational Weight Gain, and Pre pregnancy BMI

Factors	LBW	Non LBW	Total
Mother's age			
At risk age	2 (25%)	6 (75%)	8 (100%)
Not at risk age	16 (34.8%)	30 (65.2%)	46 (100%)
Gestational weight gain			
Inappropriate	12 (54.5%)	10 (45.5%)	22 (100%)
Appropriate	6 (18.8%)	26 (81.2%)	32 (100%)
Pre pregnancy BMI			
Underweight	6 (85.7%)	1 (14.3%)	7 (100%)
Normal	8 (26.7%)	22 (73.3%)	30 (100%)
Overweight	3 (23.1%)	10 (76.9%)	13 (100%)
Obese	1 (25%)	3 (75%)	4 (100%)

Table 1 illustrate the results of the study. In the category of mothers at risk age of delivery 25% were the mothers who gave birth LBW babies and 75% were the mothers who gave birth non LBW babies. In the category of mothers not at risk age of delivery, 34,8% were the mothers who gave birth LBW babies and 65,2% were the mothers who gave birth non LBW babies. Inappropriate gestational weight gain mostly came from mothers who gave birth LBW babies with a percentage of 54,5% and appropriate gestational weight gain mostly came from mothers who gave birth non LBW babies with a percentage of 81,2%. For pre pregnancy BMI, underweight category mostly came from LBW groups with a percentage of 85,7%. For category normal, overweight, and obese mostly came from non LBW groups.

Results of research on the relationship of mother's age, gestational weight gain, pre pregnancy BMI with low birth weight can be seen in table 2 below:

Table 2. Relationships of Mother's age, Gestational Weight Gain, and Pre pregnancy BMI with Low Birth Weight

Variabel		LBW Status		Total	P
		LBW	Non LBW		
Mother's age	Risk	2 (25%)	6 (75%)	8 (100.0%)	0.588
	Not risk	16 (34.8%)	30 (65.2%)	46 (100.0%)	
Gestational weight gain	Inadequate	12 (54.5%)	10 (45.5%)	22 (100.0%)	0.006
	Adequate	6 (18.8%)	26 (81.2%)	32 (100.0%)	
Pre pregnancy BMI	Underweight	6 (85.7%)	1 (14.3%)	7 (100.0%)	0.019
	Normal	8 (26.7%)	22 (73.3%)	30 (100.0%)	
	Overweight	3 (23.1%)	10 (76.9%)	13 (100.0%)	
	Obese	1 (25%)	3 (75%)	4 (100)	

Table 2 showed the relationship between mother's age, gestational weight gain, and pre pregnancy BMI with low birth weight. The result were gestational weight gain and pre pregnancy BMI have a significant relationship with incidence of low birth weight. Mother's age did not have relationship with the indidencen of low birth weight.

Summary of test results Multiple logistic regression can be seen in table 3 below:

Table 3. Summary of Multiple Logistic Regression Test Results

Independent variable	Coefficient	P	OR
Gestational weight gain			
Inappropriate	1.939	0.010	0.144
Appropriate			
Pre pregnancy BMI			
Underweight			
Normal	2.006	0.014	7.433
Overweight			
Obese			

Table 3 showed the multivariate analysis of the variables. Mothers with appropriate weight gain during pregnancy will have a tendency to give birth to a non LBW babies of 0.114 times. Mother with obese category would have a tendency of gave birth to a non LBW babies 7.433 times than the underweight mother.

IV. DISCUSSION

A. Relationship of Mother's age with low birth weight

Respondents in the working area of "Puskesmas Gading Surabaya" were post partum mothers who gave birth babies aged 0 to 4 months in the period of January-April 2017. Respondents consist of case and control group. A total of 18 cases and 36 controls were selected in this study. The result of research indicated there was no significant relationship between mother's age and low birth weight. This result in in line with study conducted by Mulyanawati (2016) that found there were no significant relationship between maternal age and low birth weight. Adamson (2007) also found that maternal age was have no significant relation with low birt weight. The population of mothers at risk age delivery were in small amount, so in this research mother's age has no relationship with low birth weight. Another study by Syahnawaz (2015) dan Kuamr (2010) found that there were relationship between maternal age and incidence of low birth weight. Study by Bisai (2006) also found that mother's age under 19 years old has tendency 2,93 times for gave birth low birth weight baby compared to mother aged 19-28 years old. For subsequent research, better the population should be set larger in order to get more significant result.

B. Relationship of gestational weight gain with low birth weight

Respondents in the working area of "Puskesmas Gading Surabaya" were post partum mothers who gave birth babies aged 0 to 4 months in the period of January-April 2017. Respondents consist of case and control group. . A total of 18 cases and 36 controls were selected in this study. The result of research indicated there was a significant relationship between gestational weight gain and low birth weight. This research is in line with research conducted by Yang (2015) in China that stated gestational weight gain had a relationship with low birth weight. A study conducted by Khoiriyah (2015) also gave a result that gestational weight gain had a signifcant relationship with low birth weight. The research conducted by Watanabe (2015) showed that low gestational weight gain have been associated with the delivery of smaller infants. This research showed that appropriate weight gain during pregnancy had tendency of gave birth of non low birth weight baby 0,144 times compared to mothers with inappropriate gestational weigh gain. According a theory by Nadesul (2008), pregnancy caused the metabolism of energy and nutrition increased. Additional energy and nutrition needed for maternal dan fetal growth. Study conducted by Hanieh et al (2014) found that the rate of gestational weight gain significantly associated with infant weight-for-age. Therefore, mother's should get adequate food and nutrition to improve appropriate weight gain during pregnancy. Gestational weight gain should be appropriate, not too small and not too much because it can affect anthropometric size of infants. This can be fulfilled by eating nutritious balanced food.

C. Relationship of pre pregnancy body mass index with low birth weight

Respondents in the working area of "Puskesmas Gading Surabaya" are post partum mothers who gave birth babies aged 0 to 4 months in the period of January-April 2017. Respondents consist of case and control group. .

A total of 18 cases and 36 controls were selected in this study. The result of research indicated there was a significant relationship between pre pregnancy body mass index and low birth weight. This research is in line with research conducted by Pan (2016) in rural area of China that stated pre pregnancy BMI was associated with low birth weight. A study conducted by Murai (2017) showed that pre pregnancy BMI had significant relationship with low birth weight and pre pregnancy body mass index could be a predictor of low birth weight in Japan. Study conducted by Agrawal in India also stated that pre pregnancy BMI was associated with low birth weight. Based on research by Irawati (2014), pre pregnancy body mass index can be predictor for length and weight of infants. Pre pregnancy body mass index were an indicator of nutritional status for mother. Pregnancy should be well-prepared, which is metabolism activity and the need for energy were increased. Therefore, before pregnancy mothers should well-prepared especially start pregnancy with good nutritional status (body mass index).

V. CONCLUSIONS

Based on the result of the research, it could be concluded that:

1. Mother's age have no significant relationship with low birthweight.
2. Gestational weight gain and pre pregnancy body mass index have a significant relationship with low birth weight.

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