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Maternal Factors Associated with Birth Length in Gowa District, South Sulawesi Province, Indonesia

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Abstract

Objective: This study aims to determine the factors of the mother that influence the body length of the baby at birth.
Methods: This study used a cross sectional design involving 269 babies born in several health centers in Gowa district. Measurement of body length is carried out a maximum of 72 hours after the baby is born, as well as the height and weight of the mother. Information regarding maternal age, parity, and gestational age were obtained by conducting interviews using a structured questionnaire. Data analysis used linear regression.
Results: The results showed that maternal height (p = 0,000) and gestational age (p = 0,000) are correlated with the child's body length at birth. While maternal weight, parity and maternal age were not significantly associated (p> 0.05).
Conclusion: In this study it can be concluded that maternal factors that can affect the child's body length are height and gestational age when the mother gives birth.

KEYWORDS : Parity; Gestational age; Mother Age; Height; Weight

Introduction

The problem of stunting is currently one of the global issues and is often found in various countries especially developing countries. At present, Indonesia is one of the countries with a high prevalence of stunting compared to other middle-income countries. Based on basic health research in 2018, the prevalence of stunting in children under five was 30.8%[1]. This figure is still relatively high from the World Health Organization (WHO) defined limit of 20%. The problem of stunting does not only occur in infants, but also in newborns. Based on data of basic health research 2013 shows that 1 in 5 children born are stunted in Indonesia[2].

Stunting indicated a failure to achieve one's genetic potential for height. The main causes of stunting include intrauterine growth retardation, inadequate nutrition to support the rapid growth and development of infants and young children and frequent infections during early life[3]. The newborn's body length is not only related to perinatal morbidity and mortality but will also have an impact on future health such as obesity, cardio metabolic disorders and neuro-psychiatric. Some studies say that short-bodied people tend to have lower intellectual performance which can reduce work capacity, increase the risk of cardiovascular disease, type 2 diabetes, and psychiatric conditions[4,5].

There is a several maternal factors that are thought to affect the birth length of the baby. Mother's height is the most reported variable related to birth length[6-9]. Another factor like maternal age, maternal weight, parity and gestational age allegedly related to birth length[4]. The purpose of this study was to analyze factors related to the baby's body length at birth.

Method

This is a cross sectional study was conducted in seven working areas of health centers in Gowa District, South Sulawesi. This research was conducted from July to September 2017. The study involved 269 babies born in the health center. Samples were taken according to criteria such as single-born babies and in the age range of 37 to 40 weeks of birth, had a normal birth weight (> 2500 g), were born normally and maximum third parity. This study was approved by the Human Research Ethics Committee under the Research and Community Service Institute of Bogor Agriculture University (No.01/IT3.KEPMSM-IPB/SK/2017).

The baby's body length is measured maximally on day three after the baby is born using a body length measuring instrument with a level of accuracy of 0.1 cm. Likewise the weight and height of breastfeeding mothers are measured together with measurements of the baby's body length. The body weight was measured using a SECA digital weighing scale (SECA 813 model, Hamburg, Germany), while a microtoise tape was used to measure height (GEA Medical SH-2A, Germany). The anthropometric measurements were performed in lightly clothed barefooted participants. Nutritional status of the mother is determined by calculating body mass index value. Data related to information on maternal age, parity, gestational age, and other socio-economic data were collected using a structured questionnaire.

Data was analyzed using the SPSS program. Univariate analysis is performed to determine the distribution of each variable. Then a bivariate analysis was performed using the pearson correlation to determine the factors associated with body length at birth. Then multiple regression is performed to find out the factors that most influence the body length. A p-value of <0.05 was considered significant.

Results

Table 1 shows that the majority of respondents are 20-25 years old at 42%. In terms of level of education, most of mothers have completed education levels up to 12 years (50.95). For parity, the majority of respondents in this study belong to the multiparous category (parity ≥2) which is 68.8%. Most of infant were born at 37 weeks of gestation (75.5%). In this study most of the mothers had normal nutritional status based on the BMI which is 61%, although it was found that mothers with BMI status included obesity (14.5%) and underweight (7.8%).

Table 1. Characteristics of postpartum mothers

Maternal characteristics	n	%
Age (years)		
20 – 25	113	42.0
26 – 30	78	29.0
31 – 35	78	29.0
Education (years)		
< 9	63	23.4
9-11	69	25.7
≥ 12	137	50.9
Parity number		
1	84	31.2
2	98	36.4
3	87	32.4
Gestational age (weeks)		
37	203	75.5
38	10	3.7
39	17	6.3
40	39	14.5
Body mass index		
Underweight (<18.5)	21	7.8
Normal (18.5 – 24.9)	164	61.0
Overweight (25.0 – 26.9)	45	16.7
Obese (≥ 27)	39	14.5

Bivariate analysis showed that gestational age and maternal height were significantly related to birth length (Table 2). Another factors like maternal age, parity, and maternal weight were not related to birth weight. The same thing is shown by multiple linear regression analysis that, among the studied factors, only gestational age (coefficient beta= -0.990; p= 0.000) and maternal height (coefficient beta = -0.068; p=0.029)were significantly associated with birth height (Table 3). The latter negative finding indicates that the lower the gestational age and maternal height, the lower the birth height will also decrease (short). Moreover, the R^2 value in this study was 0.169, indicated that 16.9% of the variations in the birth length could be explained by this model, while 83.1% was influenced by other variables.

Tabel 2. Bivariate analysis of factors related to birth length

Factor	r	P
Maternal age	-0.03	0.628
Gestational age	-0.393	0.000
Parity	0.53	0.386
Maternal height	-0.231	0.000
Maternal weight	0.012	0.850

Table 3. Multiple linear regression analysis of factors related birth length

Factors	Coefficient beta	S.E	95% CI	P
Maternal height	-0.068	0.031	-0.130 to -0.007	0.029
Gestational age	-0.990	0.162	-1.311 to -0.670	0.000
Constant	94.980	6.587	82.011 to 107.948	0.000

*significant at p<0.05, R^2 =0.169

Discussion

In this study it was found that maternal height can affect the body length of babies born. This is in line with several studies such as those conducted by Myklestad et al and by lamana et al who found that there was a height between the mother and the length of the baby's birth[6,7]. The associations between maternal height and pregnancy outcomes have been interpreted based upon a mechanistic assumption—that maternal height sets a physical constraint on the intrauterine environment (shorter women may have a small uterus size, limiting fetal growth)[4].

In addition to height, other variables related to baby's height at birth are gestational age. Some previous studies have shown that gestational age has a correlation with height when a child has grown[10,11]. Even so, until now it is unclear how the mechanism of gestational age affects height at birth. Children born with less than normal gestational age are at risk for future growth disorders[12,13]

In this study there was no association between maternal weight and birth length. This is in line with several studies that found similar results[14]. The relation between birth length and adult height was much stronger than the relation between birth weight and adult weight[9]. Parity and maternal age were also found to have no relationship with birth length. This is in line with Sukmani research, which found that there was no relationship between maternal age, maternal weight and parity with a birth length and weight birth[15]. In this study, the variables related to parity and age of the mother were controlled first, namely taking a sample of maximal third parity and maternal age between 20-35 years. This might affect the results of linear regression analysis so that no relationship was found. There are still some variables that are thought to have a strong influence on birth lengths such as maternal intake, environmental influences, paternal height, education of mother, etc. However, these factors were not examined in this study and this might be one of the weaknesses of this study.

Conclusion

In this study it can be concluded that maternal height is one of the important variables of concern because it can affect the length of birth of the baby. In addition, gestational age at delivery is also an important factor that determines the nutritional status of the baby at birth. Further research is needed to look at other variables that might influence the nutritional status of babies born such as maternal intake and paternal height.

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