

Maternal chronic energy deficiency is associated with child stunting

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ABSTRAK

Latar Belakang: *Stunting merupakan masalah gizi yang berdampak dalam jangka panjang. Stunting mempunyai dampak pada perkembangan kecerdasan, perkembangan fisik, meningkatkan risiko infeksi, dan sebagai contributor yang signifikan dalam meningkatkan risiko kesakitan dan kematian. Angka stunting di Indonesia masih tinggi menurut WHO (30,8%). Status gizi ibu berkontribusi pada pembatasan pertumbuhan janin yang meningkatkan risiko BBLR dan meningkatkan risiko stunting.*

Tujuan: *Penelitian ini bertujuan untuk mengetahui hubungan antara status gizi ibu saat hamil dengan kejadian stunting pada anak usia 6-23 bulan di Kabupaten Karawang.*

Metode: *Penelitian ini merupakan penelitian observasional dengan desain cross-sectional. Jumlah sampel sebanyak 207 anak berusia 6-23 bulan di desa Srikamulyan, Kabupaten Karawang. Pengambilan data menggunakan kuesioner terstruktur untuk mengetahui identitas anak, identitas ibu, status gizi anak, riwayat status gizi ibu saat hamil, dan data sosiodemografi. Pengukuran antropometri terhadap tinggi badan ibu menggunakan microtoise dan panjang badan anak menggunakan length board. Data dianalisis menggunakan analisis univariat dan bivariat.*

Hasil: *Hasil penelitian menunjukkan sebanyak 23,67% anak usia 6-23 bulan mengalami stunting di Desa Srikamulyan. Ibu yang mengalami Kekurangan Energi Kronis selama kehamilan sebanyak 8,2%. Analisis data menunjukkan bahwa ibu dengan Kekurangan Energi Kronis selama kehamilan berhubungan dengan stunting pada anak usia 6-23 bulan ($p < 0,05$).*

Kesimpulan: *Malnutrisi Energi Kronik selama kehamilan berhubungan dengan kejadian stunting pada anak usia 6-23 bulan. Pencegahan dari remaja putri merupakan upaya kunci penting dalam meningkatkan status gizi ibu usia subur dan ibu hamil dalam rangka mencegah stunting.*

KATA KUNCI: *kurang energi kronis; stunting; status gizi ibu hamil; anak usia 6-23 bulan*

ABSTRACT

Background: *Stunting is a nutritional problem that has a long-term impact. It has an impact on children's cognitive and physical development, serious infections, and makes a significant contribution to mortality and morbidity. According to WHO, the stunting rate in Indonesia is still high (30.8%). Maternal nutritional status contributes to fetal growth restriction which increases the risk of low birth weight and increases the risk of stunting.*

Objectives: *This study aims to determine the relationship between maternal nutritional status during pregnancy and stunting in children aged 6-23 months in Karawang Regency.*

Methods: *This study is an observational study with a cross-sectional design. The number of samples was 207 children aged 6-23 months in Srikamulyan village, Karawang regency. Data were collected using a structured questionnaire to determine the identity of the child, the identity of the mother, the nutritional status of the child, the history of the nutritional status of the mother during pregnancy, and sociodemographic data. Anthropometric measurements of the mother's height using a microtoise and the child's body length using*

a length board. Data were analyzed using univariate and bivariate analysis.

Results: The results showed that as many as 23.67% of children aged 6-23 months experienced stunting in Srikamulyan Village. Mothers who experience Chronic Energy Malnutrition during pregnancy as much as 8.2%. Data analysis showed that mothers with Chronic Energy Malnutrition during pregnancy were associated with stunting in children aged 6-23 months ($p < 0.05$).

Conclusions: Maternal chronic energy deficiency is associated with the incidence of stunting in children aged 6-23 months. Prevention efforts from adolescent girls are an important key in improving the nutritional status of women of childbearing age and pregnant women to prevent stunting

KEYWORDS: maternal chronic energy deficiency; stunting; maternal nutritional status; children aged 6-23 months

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INTRODUCTION

Malnutrition remains a critical public health problem among children under the age of five years in developing countries including Indonesia. Malnutrition is caused by multiple interlinked factors and has both short and long-term detrimental health effects (1,2). In some developing countries, it is estimated that 12 million children under 5 years of age die from infection, and malnutrition is a contributing factor to half of these deaths (3). According to the World Health Organization (WHO), at least 155, 52, and 99 million children under the age of five were stunted, wasted, or underweight in 2016 (4,5).

Stunting is classified as a height-for-age Z score of less than -2, or two standard deviance under the age-sex median for a very well reference population (6). Stunting, like other anthropometric measurements, is a critical public health indicator. The Lancet series on maternal and child undernutrition recommended the use of stunting and

wasting in trying to assess nutritional status, designing programs, and evaluating outcomes (7,8). It also highlighted stunting's long-term effects on adult health and human capital (9).

Stunting has a complex etiology. Realizing the causal factors in the prenatal period, such as maternal height, weight gain, anemia, and infection, and also the postnatal period, such as infant and child feeding and infections, is critical. Stunting is thought to be closely related to income and access to health care (8). An underweight mother is at a higher risk of stunting and wasting, highlighting the importance of maternal body composition on pregnancy outcomes. Stunting is also increased by the mother's young age at first delivery (10).

Stunting is a consequence of malnutrition in children. According to data from Indonesian Basic Health Research (Riskesdas) (2013), the prevalence of

stunting nationally in 2013 was 37.2 percent, which means an increase compared to 2010 (35.6%) and 2007 (36.8%). The results of the Indonesian Basic Health Research (Riskesmas) in 2018, the stunting rate decreased to 30.8% (11,12). This incidence rate is still high and the recommendation from WHO for stunting in children is <20%. Karawang Regency is one of the priority districts for stunting interventions because the prevalence was quite high, namely 34.87% (13).

Toddlers who experience stunting will increase the risk of failure in growth and development. According to the UNICEF framework, the direct causes of nutritional problems including stunting are poor nutritional intake and infectious diseases, while the indirect factors are parenting patterns, availability of health services, and food availability at the family level (14). In developing countries, growth failure begins several months after birth. The causes of premature stunting are not known with certainty but include inadequate intake of nutrients and infection(15).

Maternal nutritional status during pregnancy is a critical causative factor in the first thousand days of life. The nutrition of a pregnant woman is the primary source of food for embryonic growth and development, which is the start of life (16). Maternal malnutrition contributes to fetal growth restriction which increases the risk of neonatal death and for babies born to survivors to experience stunting at the age of 2 years (5). Poor nutrition throughout pregnancy, which would be the beginning of life in the first thousand days of life, when

growth occurs at a rapid pace, is dangerous to stunting in the first two years of life(5). Research by Black et al (2008) also stated that there is a relationship between maternal nutritional status (BMI and height) with fetal growth restriction, which will result in low birth weight. Fetal growth restriction also contributes to stunting and underweight in children. The study also stated that mothers who experienced stunting (height <145 cm) and low BMI had a higher risk of giving birth to premature babies(7). A study shows that if the mother's height or BMI is low, their child is more likely to be stunted (17). Maternal malnutrition can be seen by anthropometric indicators such as low mid-upper arm circumference (MUAC) (18). From the explanation above, it can be concluded that many factors influence the incidence of stunting, one of which is the nutritional status of the mother. This study aims to determine the relationship between maternal nutritional status and the incidence of stunting.

MATERIALS AND METHODS

This research was an observational study with a cross-sectional design. This research was conducted in two villages in Karawang Regency, namely Sukaluyu Village, Teluk Jambe Timur District and Sri Kamulyan Village, Tirtajaya District. The reason for choosing Sukaluyu Village was because it was included in sector 17 in the implementation of the Thematical Community Service Program (KKN) "Citarum Harum" according to the Decree of the Head of Region III Higher Education Service Institute, Number: 628/L3/KM/2018. Meanwhile, the reason for choosing Srikamulyan Village was

because it was one of the villages to accelerate the stunting reduction in Karawang Regency according to the direction of acceleration stunting reduction in 10 Priority Regencies/Cities in Indonesia.

The sample in this study was 207 mothers whose toddlers were aged 6-23 months. The inclusion criteria was all mothers with children aged 6 – 23 months who are willing to participate in this research. The exclusion criteria were mothers who withdraw from the study and had children with physical disabilities and mental disorders. The sampling technique was non-probability with purposive sampling. Data taken included sociodemographics, the child's weight and length, and data on maternal health history during pregnancy. Data collection was done by measuring and interviewing respondents directly. Sociodemographic data were obtained by using a questionnaire. Data on the child's weight and length were taken using a digital weight scale and a length-measuring device (length board). The operational definition of stunting was children aged 6-23 months who have height-for-age below -2 SD of the median of the standard curve (WHO reference population) (19). Maternal health data were taken by interviewing using

a questionnaire and reconfirmed using a maternal and child health book (KIA). Mothers who experience chronic energy deficiency if the mid-upper arm circumference (MUAC) $< 23,5$ cm during the pregnancy. Analysis of research data was carried out to determine the prevalence of stunting in Sukaluyu Village and Srikamulyan Village and to describe the nutritional status of mothers during pregnancy. Univariate analysis using the STATA version 12 program. Bivariate analysis was used to determine the relationship between the independent variable and the dependent variable using the chi-square test. This research has received ethical approval with number 03/18.12/034 from the Research Ethic Commission Universitas Muhammadiyah Dr Hamka (2).

RESULTS AND DISCUSSIONS

The results of anthropometric measurements showed that the prevalence of stunting in children aged 6-23 months in Sukaluyu and Sri Kamulyan villages was 31%. **Table 1** shows the characteristic of the sample. The average body length of under-five children (aged 6 – 23 months) was 73.97 cm and body weight was 8.7 kg.

Table 1. Characteristics of the sample based on the nutritional status of children under two and mother (resource : Primary Data)

Variable	N	Minimum	Maximum	Mean
Body weight	207	5.5	29.5	8.7
Body length	207	46	93	73.97
Mother's weight	207	34	98	56.4
Mother's height	207	135	175	154

Resource: Primary Data

Table 2. Frequency distribution of stunting children aged 6-23 months based on Z-Score

Variable Sex	Stunting (n%)	Not Stunting (n%)
Male	29 (28.71%)	72 (71.29%)
Female	20 (18.87%)	86 (81.13%)
Total	49 (100%)	158 (100%)

The mother's average weight at the time of data collection was 56.4 kg and the height was 154 cm. We can see from the results in Table 1 that there are mothers who have a height of less than 150 cm. According to research by Amaha and Woldeamanuel (2021), mothers with a height of less than 150 cm have a risk of having stunted children 2.5 times compared to mothers with a height above 160cm (20). **Table 2** shows that there

are 28.71% of boys were stunted and 18.87% of girls were stunted.

Table 3 is the result of statistical tests that show the relationship between maternal nutritional status and the incidence of stunting in children aged 6-24 months. The results of statistical tests showed that there was a significant relationship between maternal nutritional status and the incidence of stunting in children aged 6-24 months ($p < 0.05$).

Table 3. Relationship between maternal nutritional status and stunting (children aged 6-23 months)

Variable	Stunting (n%)	Not Stunting (n%)	Total (n%)	P-Value
Mother's Nutritional Status				0.018*
Chronic Energy Malnutrition	9 (52.94%)	8 (47.06%)	17 (100%)	
Not Chronic Energy Malnutrition	149 (78.42%)	158 (100%)	190 (100%)	

This study found that mothers who experienced chronic energy malnutrition and had stunted children were 47.06% and mothers who did not have chronic energy malnutrition had stunted children as many as 21.58%. These results are in line with research conducted by Fajrina (2016), namely mothers who had chronic energy malnutrition (Upper Arm Circumference (LLA) < 23.5 cm) and had stunted children by

75% and those who did not have chronic energy malnutrition (Upper Arm Circumference (LLA) ≥ 23.5 cm) had stunting children of 41.9%(21). Research conducted by Elfrida (2015) stated that mothers who experience SEZ and had stunted children were 71.4% and those who did not have chronic energy malnutrition had stunted children by 28.6%(22). The results of statistical tests that looked at the relationship

between maternal nutritional status as measured using the Upper Arm Circumference (LLA) indicator showed that there was a significant relationship between maternal nutritional status and the incidence of stunting in children aged 6-24 months. These results indicated that this study was in line with research conducted by Fajrina (2016) and Sartono (2013) which showed that there was a significant relationship between chronic energy malnutrition and the incidence of stunting (21,23).

In addition, research by Trihardiani (2011) also showed that pregnant women who experienced chronic energy malnutrition (KEK) had an 8.24 times greater risk of giving birth to babies with low birth weight and stunting effects on children (24). Mothers who had a history of chronic energy deficiency during pregnancy can inhibit the growth process of the fetus, so the mother was at risk of giving birth to babies with low birth weight and at risk of having stunted children by 4.154 times (25,26). Pregnant women with chronic energy malnutrition were the cause of 25-30% Intrauterine Growth Retardation (IUGR) in the fetus which can cause not optimal growth after birth. In addition, children who had a history of LBW would experience slower linear growth compared to children born with a history of normal birth weight.

Research Wellina, et al. (2016) regarding risk factors for stunting said that the proportion of children aged two years with low birth weight tended to have a stunting risk of 3.63 times compared to children under two years of age who had normal weight at birth (27). Research conducted by Kpewou, et al (2020) showed that infant length-for-age z-

scores were substantially correlated with maternal MUAC (regression coefficient 0.06, 95% CI [0.03, 0.09]). Infants born from mothers with low MUAC during pregnancy had a 1.6 times higher risk of stunting during the first 3.5 months of life compared to infants born from mothers with a MUAC > 23cm (odds ratio 1,621, 95% CI [0,998, 2,636])(18).

The necessity of maintaining a healthy maternal MUAC during pregnancy was shown by this study. Improving mother MUAC during pregnancy should be incorporated into interventions that seek to combat childhood stunting.

CONCLUSION AND RECOMMENDATIONS

There is a significant relationship between maternal chronic energy deficiency during pregnancy (chronic energy malnutrition) and the incidence of stunting in children aged 6-23 months. These results indicate that nutritional interventions from the period of adolescent girls to pregnant women are key to reducing stunting rates in Indonesia.

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