

Original Research Paper

Low birth weight and chronic energy deficiency in the mother lead to stunting: a case-control study

Nida Faradisa Fauziyah* , Aliffia Setyawibowo Putri

Faculty of Medicine, Universitas Muhammadiyah Surakarta, Jend. Ahmad Yani Street, Pabelan, Kartasura, Sukoharjo, Central Java 57169, Indonesia

 nff220@ums.ac.id

Submitted: October 16, 2022

Revised: November 25, 2022

Accepted: January 12, 2023

Abstract

Stunting, a malnutrition problem, is defined as shorter in height than its peers. Indonesia has Southeast Asia's third-highest stunting rate, averaging 36.4% from 2005 to 2017. Stunting requires special attention because it interferes with the optimal development of children, causes mortality, and pain, and inhibits the development of movement skills. The study aimed to analyze the relationship between Low Birth Weight (LBW) and a history of Chronic Energy Deficiency (CED) in mothers with stunting. The study used an observational analytic case-control study design using secondary data, with a case-control ratio of 1:1. Toddlers aged 0 to 5 are included. They are using purposive sampling with 142 samples. The results of the study were samples of toddlers aged 0-5 years, male sex as much as 86 (60.6%), low birth weight as much as 80 (56.3%), chronic energy deficiency in mothers as much as 88 (62%). The chi-square test results show a relationship between low birth weight and the incidence of stunting with $p < 0.000 < 0.05$ and a relationship between a history of chronic energy deficiency in mothers to stunting with $p < 0.000 < 0.05$. According to the logistic regression test findings, LBW has an OR of 26.83 with stunting, and a history of chronic energy deficiency in mothers has an OR of 4.4 with stunting. The study concluded a close relationship between low birth weight (LBW) and a history of chronic energy deficiency (CED) and stunting incidence.

Keywords: chronic energy deficiency; low birth weight; stunting

1. Introduction

Stunting is one of the health problems associated with malnutrition, especially in the first 1000 days of life, characterized by shorter height than children at their age. According to the study, there are findings that low birth weight babies and pregnant women with chronic energy deficiency are risk factors for stunting in toddlers, and to overcome this, local health centers optimize classes for pregnant women, increase nutrition coaching in adolescents, and counseling on infant and child feeding (Agustina et al., 2022). According to UNICEF, in 2020 there were 22% of children under five in the world were stunted. This figure is slightly higher than in 2018 at 21.9% (Meikawati et al., 2021). The magnitude of the shortness problem in children under five and the impact caused by the World Health Organization (WHO) through the World Health Assembly (WHA) targets the prevalence of shortness in 2025 to decrease by 40% in all countries that have shortening problems (Dewi et al., 2019). According to WHO, Indonesia is the third country with the highest prevalence in Southeast Asia, with an average prevalence of stunting toddlers in 2005-2017 of 36.4% (Meikawati et al., 2021). Basic health research data from Riskesdas 2018 shows that the highest prevalence of stunting in toddlers is 12-23 months, as much as 37.7% (Kemenkes RI, 2018).

Research on stunting has been done before. However, research on stunting has never been carried out in the Banyumas area, especially in the Cilongok Health Center Area, where stunting cases are quite high. Based on data from the Ministry of Health of the Republic of Indonesia 2020, Banyumas Regency



has the second-highest stunting prevalence in Central Java, reaching 31.2% (Dinkes Jateng, 2018). One of these districts is located in Banyumas Regency, namely Cilongok District, which there is Cilongok Village with the second highest stunting prevalence after Gununglurah Village (Wahyurini et al., 2019). From the explanation above, this research is very important; there has been no published research on stunting in Cilongok Village. This study aims to analyze the relationship between Low Birth Weight (LBW) and a history of Chronic Energy Deficiency (CED) in mothers with stunting events.

2. Research Methods

This observational analytical study uses a case-control research design on secondary data. The subjects of the study were toddlers who were recorded in secondary data in Cilongok Village in February. From the overall data obtained, further categorization was carried out in the form of inclusion criteria that represent the research sample and qualify as a sample and exclusion criteria that cannot represent the sample because they do not qualify as a research sample. Inclusion criteria are toddlers aged 0-5 years in Cilongok village, toddlers with complete immunization history, and toddlers carrying out routine weight calculations recorded in the KIA book. The criteria for exclusion of toddlers with other comorbidities, non-exclusive breastfeeding history, and secondary data in incomplete medical records with the toddler population in Cilongok Village in 2022 are 541 toddlers. The sampling technique in this study used the principle of purposive sampling with a total sample of 142 toddlers. This research instrument is a worksheet made in columns obtained from KIA books with a collection method using medical record data / secondary data which includes name, age, gender, birth weight, birth height, mother's upper arm circumference (LILA), Z-score TB / U. Data processing using Chi-Square test and logistic regression. This research has passed the ethical clearance procedure Number: 4574/C.1/KEPK-FKUMS/XI/2022.

3. Results and Discussion

3.1. Frequency Distribution

Table 1 shows that this study was successfully carried out in Cilongok village in February 2022 with a total sample of 142 toddlers, with details of 71 stunted toddlers and 71 non-stunted toddlers selected according to restriction criteria. The frequency distribution in this study, toddlers were male (60.6%) more than female (39.4%). The category of Chronic Energy Deficiency (CED) of pregnant women included in the sample of this study was more in the abnormal category (62%) compared to normal (38%). In line with that, the Low Birth Weight (LBW) category is also more in the abnormal category (65.3%) than normal (43.7%).

Table 1. Frequency distribution results

Characteristic	Frequency (n)	Percentage (%)
Gender		
- Male	86	60.6
- Female	56	39.4
Birth Weight		
- Abnormal	80	56.3
- Normal	62	43.7
CED		
- Abnormal	88	62
- Normal	54	38
Stunting		
- No Stunting	71	50.0

Characteristic	Frequency (n)	Percentage (%)
- Stunting	71	50.0

3.2. Bivariate Analysis

Table 2 shows that Low Birth Weight has a significant relationship with the incidence of stunting in toddlers ($p = 0.0000$) $<$ (0.05) with an OR value of 31.429 times the risk of stunting.

Table 2. Results of bivariate analysis of the Low Birth Weight (LBW) category with stunting incidence

Birth Weight	Category Z score				P value	OR value	95% CI
	No Stunting		Stunting				
	N	%	N	%			
Abnormal	16	22.5	64	90.1	0.000	31.429	12.052 – 81.960
Normal	55	77.5	7	9.9			
Total	71	100	71	100			

Table 3 shows a significant relationship between Chronic Energy Deficiency (CED) in mothers and the incidence of stunting in toddlers ($p = 0.000$) with an OR value of 6.097 times the risk of stunting.

Table 3. Results of bivariate analysis of Chronic Energy Deficiency (CED) category with stunting incidence

CED	Category Zscore				P value	OR value	95% CI
	No Stunting		Stunting				
	N	%	N	%			
Abnormal	30	42.3	58	81.7	0.000	6.097	2.841 – 13.088
Normal	41	57.7	13	18.3			
Total	71	100	71	100			

3.3. Multivariate Analysis

Table 4 shows that the variable Low birth weight (LBW) has a significant relationship indicated by a p-value of 0.000, and the variable Chronic Energy Deficiency (CED), denoted by the variable LILA, has a significant relationship indicated by a p-value of 0.003. In the Low Birth Weight (LBW) variable, an OR value of 26,830 was obtained, which showed that low birth weight would have a 26,830-fold risk of stunting in toddlers. In Chronic Energy Deficiency (CED) variable, an OR value of 4,459 was obtained, which showed that an abnormal size of upper arm circumference was 4,459 times the risk of stunting in toddlers.

Table 4. Multivariate Analysis Results

Variable	Coefficient	P Value	Exp(B)	95% C.I.for EXP(B)	
				Lower	Upper
LBW	3.290	.000	26.830	9.920	72.563
CED	1.495	.003	4.459	1.673	11.882
Constant	-2.924	.000	0.054		

The results of this study stated that there is a relationship between low birth weight (LBW) and the incidence of stunting. Infants with low birth weight have a 31.4-fold risk of stunting. The results of this

study are similar to research conducted by Muqni (2012), showing that birth weight is a significant predictor in determining short status in infants aged 12-60 months in Makassar (Muqni et al., 2012). History of LBW status with stunting in children under two years where children with low birth weight have a 5.87 times risk of stunting in North Hulu Sungai Regency (Rahayu et al., 2015). According to Arifin (2012), children with low birth weight followed by suboptimal food intake, inadequate health services, and frequent infections during growth will continue to result in stunted growth and produce stunted children (Arifin et al., 2012). Birth weight is generally strongly associated with fetal death, neonatal and post-neonatal mortality, infant and child morbidity, and long-term growth and development. The impact of babies with low birth weight will last from generation to generation. Children with low birth weight have anthropometric measures that are less than normal values, so they can cause children to become stunted and impact cognitive, motor, and verbal development (Ruswati et al., 2021). Babies with low birth weight are more likely to experience infections that can cause pain and are at risk of suffering from degenerative diseases (Pristya et al., 2020). In a single multivariate analysis, low birth weight variables greatly impact stunting (Rahayu et al., 2015). Other studies show different results from this study which states that there is no significant or meaningful relationship between low birth weight and stunting events (Trisiswati et al., 2021).

This study states that there is a relationship between Chronic Energy Deficiency (CED) in mothers and the incidence of stunting. Mothers with a CED history have a 6.09 times higher risk of giving birth to stunted children. Another study states that the relationship between Chronic Energy Deficiency (CED) in pregnant women and the incidence of stunting shows that toddlers with CED mothers have a 2.2 times risk of stunting compared to toddlers with mothers who are not CED (Alfarisi et al., 2019). Stunted toddlers can occur due to various causes that are interrelated. One of them is the characteristics of mothers with a history of Chronic Energy Deficiency (CED) which is closely related to the incidence of stunting in children. According to theory, CED is a nutritional problem that can occur for a long time and chronically can cause various health problems both in the mother and the fetus she contains. One of the complications of CED in mothers will appear thin and experience insignificant weight gain (Mijayanti et al., 2020). The Upper Arm Circumference (LILA) band can measure a mother with CED. In mothers with a LILA size of less than 23.5 cm or the red part of the LILA band, the mother experiences CED, while in mothers with a LILA size of more than 23.5 cm, there is no risk of CED. Pregnant women who suffer from CED have a 2-3 times greater risk of giving birth to babies with low birth weight compared to mothers who do not suffer from CED (Ismawati et al., 2021).

Suryati's research (2020) showed that mothers' age and socioeconomic education are related to the emergence of stunting in children. These factors are closely related to the mother's nutritional intake during pregnancy and her ability to provide nutritious food to her child. Pregnant women who have nutritional problems will interfere with the placenta formation process where the size of the placenta will be relatively smaller than normal size so that the function of the placenta as a transfer of nutrients and oxygen from mother to fetus will be disrupted, coupled with an abnormal placenta size will further aggravate the inadequacy of nutrients useful for fetal growth while in the womb. Pregnant women who have experienced nutritional deficiencies from the beginning and continue until the process of pregnancy tend to have babies with low birth weights (Suryati et al., 2020).

4. Conclusion

This study concludes that there is a relationship between low birth weight (LBW) and the incidence of stunting in Cilongok Village, there is a relationship between a history of chronic energy deficiency (CED) in mothers with the incidence of stunting in Cilongok Village, and there is a relationship between low birth weight (LBW) and a history of chronic energy deficiency (CED) in mothers with the incidence of stunting in Cilongok Village. The results of this research can be used as a reference for the community

and government to find the root of the problem and solve the problem of stunting. Further researchers can continue this research by looking for factors that influence the incidence of stunting and other findings on variables related to stunting problems.

Acknowledgments

This research can be carried out well thanks to assistance from various parties, for that the researcher would like to thank the Head of Puskesmas 1 Cilongok, the Investment Office and One-Stop Integrated Services of Banyumas Regency, and the Dean of the Faculty of Medicine, University of Muhammadiyah Surakarta who have provided good cooperation in this research.

References

- Agustina, Wilis, & Fathurrahman, F. (2022). Ibu Hamil KEK, Berat Bayi Lahir Rendah dan Tidak ASI Eksklusif Sebagai Faktor Risiko Terjadinya Stunting. *Jurnal Kesehatan Tambusai*, 3(1), 263–270.
- Alfarisi, R., Nurmalasari, Y., Nabilla, S., & (2019). (2019). Status Gizi Ibu Hamil dapat Menyebabkan Kejadian Stunting pada Balita. *Jurnal Kebidanan Malahayati*, 5(3), 271–278.
- Arifin, Z., Irdasari, Y., & Sukandar, H. (2012). Analisis Sebaran dan Faktor Risiko Stunting pada Balita di Kabupaten Purwakarta. Universitas Padjajaran Bandung.
- Dewi, P., Ariski, N., & Kumalasari, D. (2019). Faktor-Faktor yang Berhubungan 35 dengan Kejadian Stunting pada Balita 24-36 Bulan di Wilayah Kerja UPT Puskesmas Gadingrejo Kabupaten Pringsewu. *Wellness And Healthy Magazine*, 1(2), 231–237.
- Dinkes. (2018). Profil Kesehatan Provinsi Jawa Tengah 2018. Dinas Kesehatan.
- Ismawati, V., Kurniati, F. D., Suryati, E. O., & Oktavianto, E. (2021). Kejadian Stunting pada Balita Dipengaruhi oleh Riwayat Kurang Energi Kronik pada Ibu Hamil. *Syifa' Medika: Jurnal Kedokteran Dan Kesehatan*, 11(2), 126–138.
- Kemendes RI. (2018). Situasi Balita Pendek, Pusat Data dan Informasi Kementerian Kesehatan RI. Kementerian Kesehatan Republik Indonesia.
- Meikawati, W., Rahayu, D., & Purwanti, I. (2021). Berat Badan Lahir Rendah dan Anemia Ibu Sebagai Prediktor Stunting pada Anak Usia 12-24 Bulan di Wilayah Puskesmas Genuk Kota Semarang. *Media Gizi Mikro Indonesia*, 13(1), 37–50.
- Mijayanti, R., Sagita, Y. D., Fauziah, N. A., & Fara, Y. . (2020). Faktor-Faktor yang Berhubungan dengan Kurang Energi Kronik (KEK) pada Ibu Hamil di UPT Puskesmas Rawat Inap Sukoharjo Kabupaten Pringsewu Tahun 2020. *Jurnal Maternitas Aisyah (Jaman Aisyah)*, 1(3), 205–219.
- Muqni, A. ., Hadju, V., & Jafar, N. (2012). Hubungan Berat Badan Lahir dan Pelayanan KIA Terhadap Status Gizi Anak Balita di Kelurahan Tamamaung Makassar. *Media Gizi Masyarakat Indonesia*, 1 (2), 109–116.
- Pristya, T. ., Novitasari, A., & Hutami, M. (2020). Pencegahan dan Pengendalian LBW di Indonesia: Systematic Review. *Indonesian Journal of Health Development*, 2(3), 175–182.
- Rahayu, A., Yulidasari, F., Putri, A. O., & Rahman, F. (2015). Riwayat Berat Badan Lahir dengan Kejadian Stunting pada Anak Usia Bawah Dua Tahun. *Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*, 10(2), 67–73.
- Ruswati, R., Leksono, A. W., Prameswary, D. K., Pembajeng, G. S., Inayah, I., Felix, J., & Ashanty, A. (2021). Risiko Penyebab Kejadian Stunting pada Anak. *Jurnal Pengabdian Kesehatan*
- Suryati, S., Supriyadi, S., & Oktavianto, E. (2020). Gambaran Balita Stunting Berdasarkan Demografi Ibu di Wilayah Kerja Puskesmas Pundong, Bantul, Yogyakarta. *Medika Respati: Jurnal Ilmiah Kesehatan.*, 15(1), 17–24.

- Trisiswati, M., Mardhiyah, D., & Sari, M. (2021). Hubungan Riwayat LBW (Berat Badan Lahir Rendah) dengan Kejadian Stunting di Kabupaten Pandeglang. *Majalah Sainstekes*, 8(2), 61–70.
- Wahyurini, Sofiyya, I., & Putri, W. (2019). Pengaruh edukasi stunting menggunakan metode brainstorming dan audiovisual terhadap pengetahuan ibu dengan anak stunting. *Ilmu Gizi Indonesia*, 2(2), 141–146.