DOI: http://dx.doi.org/10.33846/hn71202
http://heanoti.com/index.php/hn

RESEARCH ARTICLE
URL of this article: http://heanoti.com/index.php/hn/article/view/hn71202

Exploring Risk Factors for Stunting Among Children aged 6-23 Months in Kendari, Indonesia

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ABSTRACT

Stunting is one of the nutritional problems in Indonesia, with a high prevalence. Stunting contributes to poor quality of life, morbidity and mortality. The aim of this study was determine several factors associated with stunting among children aged 6-23 months in Kendari City, Indonesia. This research was an observational study with a case control study approach and had been carried out at Puuwatu Health Center, Kendari City. The statistical test used was the Chi-square test and the Odd Ratio. The results showed that low birth weight in the case group was 84.4% and the control group was 15.63%. Body length at birth in the risk category in the case group was 80.0%, and the control group was 20.0%. Immunization status in the risk category in the case group was 14.3% and the control group was 85.71%. Low birth weight is associated with the incidence of stunting. Children with low birth weight status were 22.8 times more likely to experience stunting than children with normal birth weight status (OR = 22.8). Body length at birth is related to the incidence of stunting. Children with normal birth length status (OR = 18). Immunization status was not associated with the incidence of stunting.

Keywords: low birth weight (LBW); birth length; immunization; stunting

INTRODUCTION

Stunting is indicator of malnutrition that has short and long term impacts on individuals and the nation. Stunting is one of the nutritional problems in Indonesia, with a high prevalence. Stunting contributes to poor quality of life, morbidity and mortality.(1) Stunting can cause cognitive or intelligence, motoric and verbal development not develop optimally, increasing the risk of obesity and other degenerative diseases.(2) Height at 24 months is predictive of adult height, and childhood stunting is associated with cognitive deficits, reduced achievement and potential to generate income and employment. This can have an impact on reduced human resources in developing countries.(3-5)

Toddlerhood is a very difficult time sensitive to the environment so it is necessary pay more attention especially to nutritional adequacy. Nutritional problems, especially stunting in toddlers can hinder child development, with ongoing negative impacts in the next life like a decline intellectual, susceptible to non-communicable diseases, decreased productivity to cause poverty risks and giving birth to babies with low birth weight. In addition, stunting has biological implications for brain and neurological development which translates into decreased cognitive scores.(6,7) The nutritional status of pregnant women is very influential the state of health and development of the fetus. Growth disorders in the womb can occur causes low birth weight.(8) Research in Nepal shows that babies with low birth weight are at risk higher risk of becoming stunted.(9)

The birth length of the baby is also related with stunting incidents. Research in Kendal indicates that a long-term baby was born short ones are at high risk of events stunting in toddlers.(10) Other factors related to stunting is exclusive breast milk intake in toddlers. Research in Southern Ethiopia proves that toddlers who do not receive exclusive breast milk for 6 months is at high risk of experiencing stunting.(11) According to Grantham-McGregor, stunted children have the same head size smaller so that it affects brain volume and thinking power.(12)

The main causes of stunting include growth retardation, inadequate nutrition to support rapid growth and development in infants and young children and frequent infections during early life.(13,14) Several studies show

that children who are stunted have poor cognitive abilities and educational achievements into childhood and adolescence.[12,15] Several risk factors that influence the incidence of stunting in children under five are a history of low birth weight (LBW), birth length, and immunization history.[3,16-18]

METHODS

This research included observational research with an *case-control design.*[15] The population in this study were all stunting children aged 6-23 months with a total of 250 children and a total sample of 36 people. The sample size was determined by a ratio of 1:1.[20] Sample size was determined based on the calculation of the sample size for case control studies.

$$n = \frac{N.Z^2.P.q}{d^2(N-1)+2^2.p.q}$$

$$n = \frac{250\ X\ 1{,}96^2.\ 0{,}14\ X\ (1-0{,}96)}{0{,}1^2(250-1)+(1{,}96^2)\ X\ 0{,}14\ X\ (0{,}96)}$$

$$n = \frac{250\ X\ 3{,}84\ X\ 0{,}14\ X\ 0{,}96}{2.49+1{,}01}$$

$$n = \frac{129.02}{3{,}5}$$

$$n = 36$$

In this study did not use primary data. Secondary data includes: birth weight data, birth length data, immunization status data and research supporting data, namely geographic data, demographic data and other relevant data, collected using a documentation approach, namely recording data at Puuwatu Health Center.

Chi-square was used to see the relationship between two variables, namely the dependent and independent variables. Odds Ratio (OR) is the estimated risk value for the occurrence of an effect/*outcome* as the influence of the independent variable. Change 1 independent variable will cause a change of OR in the dependent variable.

RESULTS

Table 1 shows that the percentage of body weight at risk for stunting in the case group is higher when compared to the control group. In contrast, the percentage of body weight not at risk of stunting in the control group was higher when compared to the case group. The results of statistical analysis obtained p-value of 0.000, so that it could be concluded that there was a significant relationship between LBW and incidence stunting in children aged 6-23 months. Risk analysis using the OR, obtained a value of 22.8, which means that low birth weight had a 22.8 times greater risk of experiencing stunting when compared to normal birth weight (LBW is a risk factor for inciednce of stunting).

The p-value of body length was 0.000, so that it could be concluded that there was a significant relationship between body length and incidence of stunting in children aged 6-23 months. Risk analysis using the OR, obtained a value of 18, which means that body length had a 18 times greater risk of experiencing stunting.

The p-value of immunization status was 0.000, so that it could be concluded that there was a significant relationship between immunization status and incidence of stunting in children aged 6-23 months.

Table 1. The relationship between low birth weight, body length at birth, and immunization status with incidence stunting

Risk factors		Incidence of stunting				OR	p-value
		Stunting		Not stunting			
		Frequency	Percentage	Frequency	Percentage		
LBW	Risk	27	84.40	5	15.63	22.8	0.000
	Not at risk	9	19.10	38	80.85		
Body length at birth	Risk	28	80.00	7	20.00	18	0.000
	Not at risk	8	18.20	36	81.82		
Immunization status	Risk	1	14.30	6	85.71	0.18	0.08
	Not at risk	35	48.60	37	51.39		

DISCUSSION

The results of the study showed that the percentage of body weight at risk of experiencing stunting in the case group was higher when compared to the control group. On the other hand, body weight percentage does not the risk of stunting in the control group was higher when compared to the case group. Based on the results of statistical analysis, there is a significant relationship between LBW and stunting in children aged 6-23 months. The low birth weight has a 22.8 times greater risk of experiencing stunting when compared to normal birth weight. This study is in line with research conducted by Paudel et al, showing that there is a relationship between low

birth weight and stunting.[20] Low birth weight has a 4.47 times greater risk of stunting than toddlers with normal birth weight.

Birth weight is a strong predictor of future body size. This is because in general babies who experience LBW cannot pursue normal growth during childhood.[21-23] LBW babies also experience digestive tract disorders, because the digestive tract is not yet functioning, such as being unable to absorb fat and digest protein resulting in a lack of reserves of nutrients in the body. Evidence suggests that growth retardation is associated with retarded cognitive development and stunted growth in internal organs and can lead to lower cognitive abilities and an increased risk for chronic disease later in life.[4] A study in Zimbabwe found that the growth of LBW babies was far behind that of babies of normal weight and that a significant difference in length was evident at 12 months of age.[24]

The baby's body length at birth describes the baby's linear growth while in the womb. A low linear size usually indicates a state of malnutrition due to a lack of energy and protein suffered in the past which began with a slowdown or retardation of fetal growth. In adequate maternal nutrition before pregnancy causes growth disturbances in the fetus so that it can cause babies to be born with short birth lengths. Babies who are born have a normal birth length if the baby's birth length is at a length of 48-52.[25]

Based on the results of research conducted in the working area of the Puuwatu Health Center, it showed that out of 35 under-fives who were at risk of having long birth bodies, most 80.0% were at risk of stunting, and of the 44 under-fives who were not at risk of having long birth bodies, most were 18.2% were re at risk of stunting. Based on the results of statistical analysis, there is a significant relationship between birth length and the incidence stunting in children age 6-23 months, with OR of 18. This research is in line with research conducted by Anugraheni which shows that short birth length is a risk factor for stunting in children aged 12-36 months.[26] Statistical test results using Chi-square test obtained p-value of 0.0001. These results prove that there is a significant relationship between birth length and the incidence of stunting in toddlers. The results of the analysis of the risk magnitude (OR) of birth length for the incidence of stunting is 7,290. This means that toddlers with a history of short birth length at birth have a 7,290 times greater risk of experiencing stunting compared to toddlers who have normal body length at birth.

Immunization is an effort to actively generate/increase a person's immunity against a disease, so that if one day they are exposed to the disease they will not get sick or only experience a mild illness. Immunization is also needed to reduce mortality, morbidity and disability in children.[27] Based on the results of research conducted in the working area of the Puuwatu Health Center, most of the children who were at risk of having immunization status were 14.3% at risk of stunting, and of the 72 children who were not at risk of having immunization status, most were 48.6% at risk of stunting. Based on the results of statistical analysis, there is no significant relationship between immunization status and the incidence of stunting in children aged 6-23 months. This research is in line with research conducted by Sutriyawan et al. in Citarip, Bandung City, which stated that there was no significant relationship between immunization status and the incidence of stunting.[28] However, it is different from studies which found a relationship between basic immunization and the incidence of stunting in children.[29]

CONCLUSION

Incidence stunting in children aged 6-23 months in Puuwatu Health Center is related to low birth weight and birth length.

REFERENCES

1. Olofin I, et al. Associations of suboptimal growth with all-cause and cause-specific mortality in children under five years: a pooled analysis of ten prospective studies. PLoS One. 2013;8(5).
2. Kemenkes RI. Pfofil Kesehatan Indonesia tahun 2018. Jakarta: Kemenkes RI; 2019.
3. Christian P, et al. Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low- and middle-income countries. Int. J. Epidemiol. 2013;42(5):1340–1355.
4. Victora CG, et al. Maternal and child undernutrition: consequences for adult health and human capital. Lancet. 2008;371(9609):340–357.
5. Sumartini E. Studi literatur: Dampak stunting terhadap kemampuan kognitif anak. Peran Tenaga Kesehatan dalam Menurunkan Kejadian Stunting Tahun 2020. 2020:127–134.
6. Subramanian SV, Mejía-Guevara I, Krishna A. Rethinking policy perspectives on childhood stunting: Time to formulate a structural and multifactorial strategy. Matern. Child Nutr. 2016;12:219–236.
7. Alderman H, Behrman JR, Grantham-McGregor LBS, Urzua SF. Economic perspectives on integrating early child stimulation with nutritional intervention. New York: Annals of the New York Academy of Sciences; 2014.
8. WHO. WHA global nutrition targets 2025: Stunting policy brief. Geneva: World Health Organization; 2014.
9. Paudel R, Pradhan B, Wagle RR, Pahari DP, Onta SR. Risk factors for stunting among children: A community based case control study in Nepal. Kathmandu University Medical Journal. 2012;10(3):18-24.

10. Meilyasari F, Isnawati M. Faktor risiko kejadian stunting pada balita usia 12 bulan di Desa Purwokerto Kecamatan Patebon, Kabupaten Kendal. Journal of Nutrition College. 2014;3(2):16-25.
11. Fikadu T, Assegid S, Dube L. Factor associated with stunting among children age 24 to 59 months in Meskan District, Gurage Zone, South Ethiopia: A case-control study. BMC Public Health. 2020;14(800):2-14.
12. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in the first 5 years for children in developing countries. Lancet. 2007;369(9555):60–70.
13. Frongillo J. Symposium: Causes and etiology of stunting. J. Nutr. 1999;129(2 SUPPL):529–530.
14. Dewey KG, BegumK. Long-term consequences of stunting in early life. Matern. Child Nutr. 2011;7(SUPPL. 3):5–18.
15. Walker SP, Chang SM, Wright A, Osmond C, Grantham-McGregor SM. Early childhood stunting is associated with lower developmental levels in the subsequent generation of children. J. Nutr. 2015;145(4):823–828.
16. Widyawati SA, Wahyuni S, Afandi A. Factors related to stunting events in children. Ann. R. S. C B. 2021;25(6):3324–3332.
17. Harding KL, Webb P. Birthweight and feeding practices are associated with child growth outcomes in South Asia. 2018;14:1–12.
18. S C, M A. Associations of nutritional status with full immunization coverage and safe hygiene practices among thai children aged 12-59 months. Nutrients. 2021;23(14):34.
19. Turyashemererwa F, Kikafunda J, Agaba E. Factors associated with stunting among children of age 24 to 59 months in Meskan District, Gurage Zone, South Ethiopia: a case-control study. African J. Food, Agric. Nutr. Dev. 2009;9(4):1–7.
20. Paudel R, Pradhan B, Wagle RR, Pahari DP, Onta SR. Risk factors for stunting among children: A community based case control study in Nepal. Kathmandu Univ. Med. J. 2012;10(39):18–24.
21. Abeway S, Gebremichael B, Murugan R, Assefa M, Adinew YM. Stunting and its determinants among children aged 6-59 Months in Northern Ethiopia: A cross-sectional study. J. Nutr. Metab. 2018;1078480.
22. Aryastami NK, Shankar A, Kusumawardani N, Besral B, Jahari AB, Achadi E. Low birth weight was the most dominant predictor associated with stunting among children aged 12-23 months in Indonesia. BMC Nutr. 2017;3(1):1–6.
23. Nutrition M. Recent advances in nutritional sciences maternal nutrition and fetal. Nutrition. 2004;13:2169–2172.
24. Mbuya MNN, Chidem M, Chasekwa B, Mishra V. Biological, social, and environmental determinants of low birth weight and stunting among infants and young children in Zimbabwe. ZIMBABWE Working Papers. 2010.
25. Kemenkes RI. Hasil riset kesehatan dasar tahun 2018. Jakarta: Kemenkes RI; 2018.
26. Hana SA, Martha IK. Faktor risiko kejadian stunting pada anak usia 12-36 bulan di Kecamatan Pati, Kabupaten Pati. J. Nutr. Coll. 2012;1(1):30–37.
27. Kemenkes RI. Pedoman perencanaan program gerakan 1000 hari pertama kehidupan. Jakarta: Kemenkes RI; 2012.
28. Sutriyawan A, Kurniawati R, Rahayu S, Habibi J. Hubungan status imunisasi dan riwayat penyakit infeksi dengan kejadian stunting pada balita: studi retrospektif. J. Midwifery. 2020;8(2):1–9.
29. Taswin LO, Taufiq M, Astika Damayanti WO, Subhan M. Literature review dengan kejadian stunting pada balita. Jurnal Kebidanan Malakbi. 2022;4(1):51–58.
30. Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. A review of child stunting determinants in Indonesia. Matern Child Nutr. 2018 Oct;14(4):e12617.
31. Laksono AD, Wulandari RD, Amaliah N, Wisnuwardani RW. Stunting among children under two years in Indonesia: Does maternal education matter? PLoS One. 2022 Jul 25;17(7):e0271509.
32. Berendsen MLT, Smits J, Netea MG, van der Ven A. Non-specific effects of vaccines and stunting: timing may be essential. EBioMedicine. 2016 Jun;8:341-348.
33. Noor MS, Andrestian MD, Dina RA, Ferdina AR, Dewi Z, Hariati NW, Rachman PH, Setiawan MI, Yuana WT, Khomsan A. Analysis of socioeconomic, utilization of maternal health services, and toddler's characteristics as stunting risk factors. Nutrients. 2022 Oct 18;14(20):4373.
34. Shinsugi C, Mizumoto A. Associations of nutritional status with full immunization coverage and safe hygiene practices among thai children aged 12-59 months. Nutrients. 2021 Dec 23;14(1):34.
35. Yani DI, Rahayuwati L, Sari CWM, Komariah M, Fauziah SR. Family household characteristics and stunting: an update scoping review. Nutrients. 2023 Jan 2;15(1):233.
36. Aryastami NK, Shankar A, Kusumawardani N, et al. Low birth weight was the most dominant predictor associated with stunting among children aged 12–23 months in Indonesia. BMC Nutr 3, 16 (2017).
37. Banerjee, S., SubirBiswas, Roy, S. et al. Nutritional and immunization status of under-five children of India and Bangladesh. BMC Nutr. 2021;7(77).
38. Amirat KS, Sisay MM. Full immunization coverage and its associated factors among children aged 12–

23 months in Ethiopia: further analysis from the 2016 Ethiopia demographic and health survey. BMC Public Health. 2019;19(1019).
39. Murphy S, Carter L, Al Shizawi T, et al. Exploring the relationship between breastfeeding and the incidence of infant illnesses in Ireland: evidence from a nationally representative prospective cohort study. BMC Public Health. 2023;23(140).
40. De Sanctis V, Soliman A, Alaaraj N, Ahmed S, Alyafei F, Hamed N. Early and long-term consequences of nutritional stunting: from childhood to adulthood. Acta Biomed. 2021 Feb 16;92(1):e2021168.
41. Wulandari RD, Laksono AD, Kusrini I, Tahangnacca M. The targets for stunting prevention policies in Papua, Indonesia: What mothers' characteristics matter? Nutrients. 2022 Jan 27;14(3):549.
42. Pradana Putri A, Rong JR. Parenting functioning in stunting management: A concept analysis. J Public Health Res. 2021 Apr 14;10(2):2160.
43. Febriani ADB, Daud D, Rauf S, Nawing HD, Ganda IJ, Salekede SB, Angriani H, Maddeppungeng M, Juliaty A, Alasiry E, Artaty RD, Lawang SA, Ridha NR, Laompo A, Rahimi R, Aras J, Sarmila B. Risk factors and nutritional profiles associated with stunting in children. Pediatr Gastroenterol Hepatol Nutr. 2020 Sep;23(5):457-463.
44. Puri P, Khan J, Shil A, et al. A cross-sectional study on selected child health outcomes in India: Quantifying the spatial variations and identification of the parental risk factors. Sci Rep. 2020;10:6645.
45. Kohlmann K, Sudfeld CR, Garba S, Guindo O, Grais RF, Isanaka S. Exploring the relationships between wasting and stunting among a cohort of children under two years of age in Niger. BMC Public Health. 2021 Sep 21;21(1):1713.
46. Arini D, Nursalam N, Mahmudah M, Faradilah I. The incidence of stunting, the frequency/duration of diarrhea and acute respiratory infection in toddlers. J Public Health Res. 2020 Jul 2;9(2):1816.
47. Tesema GA, Tessema ZT, Tamirat KS, Teshale AB. Complete basic childhood vaccination and associated factors among children aged 12-23 months in East Africa: a multilevel analysis of recent demographic and health surveys. BMC Public Health. 2020 Dec 1;20(1):1837
48. Laksono AD, Sukoco NEW, Rachmawati T, Wulandari RD. Factors Related to Stunting Incidence in Toddlers with Working Mothers in Indonesia. Int J Environ Res Public Health. 2022 Aug 26;19(17):10654.