Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 8, July 2021: 3821 - 3828

Correlation Between Stunting in Children and Its Determinant Factors: AStudy in Small District on East Java

FarahdinaFarahdina[a], VatineAdila[b], Thalia PuteriOktariana[a]

[a]Faculty of Medicine, UniversitasBrawijaya, Malang, Indonesia

[b]Faculty of Medicine, UniversitasAirlangga, Surabaya, Indonesia

Abstract

Body length is an important indicator to monitor the growth of children. It is also associated with the incidence of short stature in childhood, which can indicate endocrine dysfunction. The incidence of short stature in Indonesia is still quite large. Factors that play a role in determining the length not only come from internal but also external. The main objective of this study was to assess the child's growth patterns and their determinant factors.A cross-sectional study was conducted in April 2020 with 167 subjects between 0-5 years old and height z score <-2 SD from nine districts registered at PuskesmasGudo, Jombang. Height, age, and gender were collected to determine z-score, and short stature diagnosis was determined by WHO plotting charts. Exclusive breastfeeding, birth weight, economical and educational status, immunization, and infection history. The collected data then analyzed using the Spearman correlation test by SPSS 17.0 version, the significant value is p<0.005.One hundred and sixty seven children with 98 boys and 69 girls (means of age 32.95 ± 14.64 months old) were recruited. Subjects mean of height-z-score -2.68±0.87, and had significant correlation with exclusive breast feeding(r=-0.54;p<0.001), immunization(r=-0.505;p<0.001) and infection history(r=-505;p<0.001), economic status(r=-0.479;p<0.001), parents educational background(r=-0.173;p=0.026).The height z score in children with short stature has a significant correlation with exclusive breastfeeding, immunization, infection history, economic status, parents educational background.

Keywords: Growth, short stature, determinant factors

1. Introduction

Stunting is an issue with a negative impact on nutritional problems in Indonesia because it affects a child physically and functionally while also increasing morbidity; therefore, the WHO has highlighted stunting to be immediately resolved. Stunting is a linear growth disorder caused by chronic malnutrition or both chronic and recurrent infectious diseases as indicated by a z-score of height-for-age (HFA) less than -2 SD.[1]Stunting can be detected when a toddler has been weighed and measured for length or height, then compared with the standard values, with the results being below

normal. Therefore, a toddler with stunting would have a shorter stature than normal toddlers of the same age.[2]

1.1.Stunting Epidemiology

Based on Riskesdasin 2018, 30.8% of toddlers suffer from stunting in Indonesia, in which 17.1% was short, and 12.8% was very short. Based on Riskesdas 2018, there has been a reduction of prevalence from 37.2% in 2018 to 30.8% in 2018. However, short toddler prevalence had increased by 0.1% from 19.2% in 2013 to 19.3% in 2018. The highest prevalence of short toddlers is 42.6% in the East Nusa Tenggara province and the lowest in DKI Jakarta with 17.7%. The prevalence of stunting in children under 2 years in 2018 was 29.9%, while the target of *Rencana Pembangunan JangkaMenengah Nasional (RPJMN)* for stunting in children under two years in 2019 is 28%.[3]

1.2.Risk Factors for Stunting

Stuntingis a health issue affected by multidimensional factors. Generally, these factors are classified into three major parts: direct, indirect, and community or environment factors.

Direct factors include (1) Food intake.The nutritional status would be optimal if the body receives sufficient nutritional requirements, allowing the optimal growth of the physique, brain, and psychomotordevelopment. (2) Exclusive breastfeeding.Breastmilk is an ideal form of food to fulfill the nutritional requirement for children in the first 6 months of life. Supplemental food is ideal subsequently; however, breastmilk remains an essentialfood source for the child's health. (3) Genders determine the amount of one's nutritional needs. The difference between the nutritional needs is affected by the difference in body composition between boys and girls. (4) History of low birthweight. Babies with low birthweight tend to develop growth retardation due to poor maternal nutrition and increased infection rates.[4]

Indirect factors include (1) History of infection. Insufficient nutritional status and infectious disease have a reciprocal association. Children who are malnourished would have lower immunity to diseases, making them susceptible to infectious diseases. Similarly, children who are exposed to infectious diseases can easily experience malnutrition. (2) Vaccination status. The goal of vaccination is to provide immunity to prevent diseases. Poor vaccination status would predispose the child to various diseases and could cause stunting in the future. (3) Economic status. The poor family economic status would affect the choice of consumed food, resulting in less amount and variations. (4) Sociocultural and parent's knowledge.Maternal education level, occupation, nutritional knowledge, and total family members are all interrelated with the maternal attitude and behavior in providing nutrition for the toddlers.[5,6]

Community or environmental factors include environmental sanitation, including clean water supply. Environmental sanitation, clean and hygienic water are also interrelated with infections, which in turn affects the incidence of stunting.[7]

1.2.Impact of Stunting

Stunting has a major impact on the children's growth and development and Indonesia's economy and competitiveness in the future. Children with stunting generally would experience restricted cognitive development, affecting their productivities in adult life. Children with stunting also have a higher risk of developing non-communicable diseasessuch as diabetes, obesity, and heart disease as adults.[8]Moreover, stunting at an early age would increase the mortality rate of infants and children, causing children to be more susceptible to diseases and have poor posture as adults. Cognitive skills would also decrease, causing long-term economic losses for Indonesia.[9]

Based on the description above, the authors wanted to conduct this research with the aim of obtaining an overview of stunting patterns in Indonesia, especially in the Jombang, East Java Region, and assess potential determinant factors of stunting.

2. Methods

This study was an analytical-observational study with a cross-sectional design. The study was conducted in April 2020. The inclusion criteria were toddlers aged 0-5 years, registered in the 9 villages in Gudo Public Health Center, Jombang. Weight, height/length measurements, age, and genders were obtained to assess the patient's status, whether they met the criteria of stunting or not. The criteria of stunting were z-score for WHO-based HFA less than -2 SD. The exclusion criteria were toddlers who did not live permanently in the area and toddlers with mental disorders or physical disabilities.The purposive sampling method was used according to the inclusion and exclusion criteria.

The independent variable in this study was the exclusive breastfeeding status (since the time of birth and 6 months of age, classified as 2 categories, yes or no), parental educational level (measured as the duration of formal education, classified as a range: less than 6 years, 6-9 years, and more than 9 years), family economic status (measured based on monthly income, classified as 3 categories: low, middle, and high), vaccination status (measured based on the vaccination according to age, classified into 2 categories: complete and incomplete), history of child's infection (infectious diseases such as diarrhea, upper respiratory tract infections, helminth infection, and pulmonary TB in the last 6 months to 1 year). The data were obtained by interview based on the questions on the questionnaire. Each respondent had signed informed consent prior to the study.

Statistical analysis was carried out with univariate and bivariate analyses. Univariate analysis was conducted to see a description of stunting incidence and the patient's and the family's characteristics. Bivariate analysis was conducted to see the correlation between the determinant factors and the incidence of stunting. Spearman correlation test was conducted with a statistical analysis program SPSS ver. 17.0. The significance level was $p<0.005$.

3. Results

A total of 167 patients met the inclusion and exclusion criteria. The patient's characteristics are shown in Tables 1 and 2. Table 1 showed the categorical data of 167 subjects. Table 2 showed numerical data of patient's characteristics. The mean age was 32.96 months, with a mean birthweight

of 3483 grams. The mean HFA z-score was -2.68±0.87. Based on the HFA, 58 of 167 subjects met the criteria for stunting (HFA z-score <-2SD).

Table 1. Subjects' Characteristics (Categorical data)

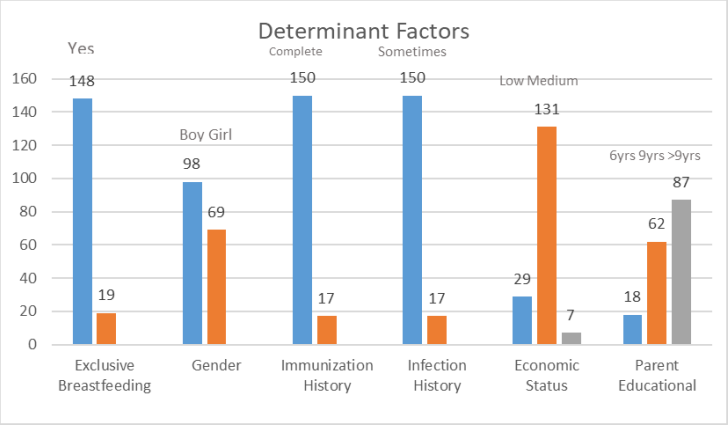
Characteristics	N(%)
Gender	
- Boy	98 (58.7)
- Girl	69 (41.3)
Exclusive breastfeeding	
- Yes	148 (88.6)
- No	19 (11.4)
Economic status	
- Low	29 (17.4)
- Medium	131 (78.4)
- High	7 (4.2)
Parental education	
- < 6 yrs	18 (10.8)
- < 9 yrs	62 (37.1)
- > 9 yrs	87 (52.1)

Table 2. Subjects' Characteristics (Numerical data)

Characteristic	n	Mean (SD)	Minimum	Maximum
Age (month old)	167	32.96 (14.65)	4	59
Family member	167	3.87 (0.88)	2	5
Birth weight (gram)	167	3483.83 (324.56)	2500	3800
Height-for-age z-score	167	-26.80 (8.77)	-79.00	-6.00

Figure 1 showed the univariate results of determinant factors in stunting. Patients who received exclusive breastfeeding were 148 subjects, 98 subjects were boys, and the remaining 69 subjects were girls. There were 150 patients with a complete vaccination status according to age, and 150 patients experienced infection in the last 6 months to 1 year. Economic status was predominantly middle with 131 subjects, and most parents (87 subjects) had a formal education of more than 9 years.

Figure 1. Univariate results of stunting determinant factors in subjects.



Bivariate results with a correlation test between the determinant factors in the incidence of stunting are shown in Table 3. There was a significant correlation between stunting and exclusive breastfeeding (r=-0.54;p<0.001), vaccination status (r=-0.505;p<0.001), history of infection (r=-505;p<0.001), family economic status (r=-0.479;p<0.001), and parental education level (r=-0.173;p=0.026).

Table 3. The correlation between stunting and determinant factors.

		Breastfeeding	Vaccination	Infection	Economic	Education
HFA	r	-0.544	-0.505	-0.505	-0.479	-0.173
	p	p<0.001	p<0.001	p<0.001	p<0.001	p=0.026

4. Discussion

Our study found a significant negative correlation between exclusive breastfeeding and stunting, indicating that exclusive breastfeeding could prevent stunting. This result is in accordance with the study in Solo, which stated that exclusive breastfeeding is a protective factor to prevent stunting in children under 5 years.[10]Tamri et al. also supported this suggestion, in which exclusive breastfeeding is the most appropriate method to meet the nutritional needs of children. Breastmilk contains a nutritional composition compatible with the child's needs and plays a positive role in the child's growth.[11]

A complete vaccination status also had a negative correlation with stunting, which may help prevent stunting. This result was in line with the study in Ethiopia. Besides insufficient nutritional intake, stunting can also be caused by increased demands due to the stress/illness state of the body. Vaccination could help prevent various diseases; therefore, indirectly help reduce the incidence of stunting.[12] Similar result was also seen in the study by Wahyuni et al. The proportion of toddlers with stunting was higher in toddlers with incomplete vaccination status. However, due to its indirect effect, toddlers with complete and incomplete vaccination status may still potentially suffer from stunting since many factors influence it.[13]

Infection which occurred in the last 6 months – 1 year had a significant correlation with the incidence of stunting. According to Millward[14], the reason is inflammatory condition caused by an infectious process could disturb ossification due to the mechanisms of proinflammatory cytokines and disruption of fibroblast growth factor 21 (FGF21). Furthermore, in helminth infections, chronic helminth infection might present asymptomatically and undiagnosed for years, which could cause chronic under-treated malnutrition, which eventually leads to stunting.[15]In addition, diarrhea infection also plays a role in stunting; this is especially common in children who live in poorly maintained areas with poor sanitation. Exposure to a poor environment may cause recurrent diarrhea, leading to malnutrition and associated with stunting if left untreated.[16]

Other than the child's health factor, an equally essential factor is family. Based on the analysis result, family economic status also had a significant correlation with stunting. This result is in line with the previous result by Ernawati et al.,[17] which stated that low family economic status is associated with an increased risk of stunting. The reason is that low economic status has an impact on the difficulty of getting quality and sanitized food, which generally tends to be poor. In the long term, this may lead to stunting. Moreover, a study conducted in Africa regarding socio-economic factors in stunting also showed similar results. Besides access to quality food and sanitation problems, children who live in poor areas often experience difficulties reaching health care facilities. Therefore, when weight faltering occurs, it is usually not detected and under-treated, leading to stunting.[18,19]

Along with the role of family economic status, parental education level also has a correlation with the incidence of stunting indirectly. Parental education level is a determinant factor to prevent stunting. The parents make decisions and play a crucial role in providing proper nutrition and nurture for their child. Better formal education can reduce the risk of stunting by up to 3-5%.[20]Based on the studies, parents who at least completed elementary school can reduce stunting by up to 2.5% and even better in those who completed formal education until middle school, which can reduce stunting by up to 10%. Therefore, completing formal education for 9 years is an essential factor to prevent stunting.[21]

5. Conclusion

Stunting is a chronic malnutrition condition that can occur due to various multidimensional factors. Exclusive breastfeeding, vaccination status, history of infection, family economic status, and parental educational background are several determinant factors that significantly play a role in stunting. Comprehensive management from multiple aspects is essential to prevent the increasing stunting rate in Indonesia.

Acknowledgments

The authors would like to thank the Endocrine Team of Dr. Soetomo Hospital, Surabaya, Indonesia.

The Author's Contribution

All authors provided significant contribution for the reported work, in conception, study design, implementation, and obtaining, analyzing, and interpreting data or all things considered in this field; all authors took part in drafting, revising, and reviewing articles critically; provided final approval

for the version to be published; have approved journals which articles have been submitted; and agreed to be responsible for all aspects of the work.

Fundings

The authors did not receive any financial support for the study.

Conflict of Interest

The authors stated that there was no conflict of interest in this study.

References

1. de Onis M, Borghi E, Arimond M, Webb P, Croft T, Saha K, et al. Prevalence thresholds for wasting, overweight and stunting in children under 5 years. Public Health Nutr. 2019 Jan;22(1):175–9.
2. Lestari W, Rezeki SHI, Siregar DM, Manggabarani S. Faktor yang berhubungandengankejadian stunting pada anaksekolahdasar negeri 014610 Sei RenggasKecamatanKisaran Barat KabupatenAsahan. Jurnal Dunia Gizi. 2018;1(1):59–64.
3. Satriawan E. Strateginasionalpercepatanpencegahan stunting 2018-2024. Jakarta: Tim Nasional PercepatanPenanggulanganKemiskinan (TNP2K). 2018;
4. Oktavianisya N, Sumarni S, Aliftitah S. FAKTOR YANG MEMPENGARUHI KEJADIAN STUNTING PADA ANAK USIA 2-5 TAHUN DI KEPULAUAN MANDANGIN. JurnalKesehatan. 2021;14(1):46–54.
5. RekawatiSusiloningrum W, Setiyaningrum Z, Gz S, Gizi M. HUBUNGAN PENGETAHUAN IBU DAN STATUS IMUNISASI DASAR DENGAN STATUS GIZI BALITA 2-3 TAHUN Studi di PuskesmasKlego 1 Boyolali [PhD Thesis]. Universitas Muhammadiyah Surakarta; 2017.
6. Nisak NZ, TitikSusilowati SKM, Gizi M. HubunganPekerjaan dan PengetahuanGiziIbudengan Status GiziBalitaDesaDuwetKecamatanWonosariKabupatenKlaten [PhD Thesis]. Universitas Muhammadiyah Surakarta; 2018.
7. Humphrey JH, Mbuya MN, Ntozini R, Moulton LH, Stoltzfus RJ, Tavengwa NV, et al. Independent and combined effects of improved water, sanitation, and hygiene, and improved complementary feeding, on child stunting and anaemia in rural Zimbabwe: a cluster-randomised trial. The Lancet Global Health. 2019;7(1):e132–47.
8. Soliman A, De Sanctis V, Alaaraj N, Ahmed S, Alyafei F, Hamed N, et al. Early and long-term consequences of nutritional stunting: from childhood to adulthood. Acta Bio Medica: AteneiParmensis. 2021;92(1).
9. Cooper MW, Brown ME, Hochrainer-Stigler S, Pflug G, McCallum I, Fritz S, et al. Mapping the effects of drought on child stunting. Proceedings of the National Academy of Sciences. 2019;116(35):17219–24.
10. Lestari ED, Hasanah F, Nugroho NA. Correlation between non-exclusive breastfeeding and low birth weight to stunting in children. PaediatricaIndonesiana. 2018 Jun 8;58(3):123–7.
11. Sirajuddin, Asbar R, Nursalim, Tamrin A. Breastfeeding practices can potential to prevent stunting for poor family. EnfermeríaClínica. 2020 Jun 1;30:13–7.

12. LisanuMazengia A, AndargieBiks G. Predictors of Stunting among School-Age Children in Northwestern Ethiopia. Journal of Nutrition and Metabolism. 2018 Sep 20;2018:e7521751.
13. Wahyuni W, Wakhidah LN, Fatmawati S, Widayati RS. The Relation of Stunting with Immunization Status and the History of Low Birth Weight in the Work Area of Public Health Center at Gilingan. In Atlantis Press; 2021 [cited 2021 Aug 11]. p. 468–71. Available from: https://www.atlantis-press.com/proceedings/pvj-ishessh-20/125953739
14. Millward DJ. Nutrition, infection and stunting: the roles of deficiencies of individual nutrients and foods, and of inflammation, as determinants of reduced linear growth of children. Nutrition Research Reviews. 2017 Jun;30(1):50–72.
15. Webb CM, Morales ML, Lopez M, Baca-Turpo B, Arque E, Jr ACW, et al. Stunting in pre-school and school-age children in the Peruvian highlands and its association with Fasciola infection and demographic factors. PLOS Neglected Tropical Diseases. 2021 Jun 21;15(6):e0009519.
16. Kinyoki DK, Manda SO, Moloney GM, Odundo EO, Berkley JA, Noor AM, et al. Modelling the Ecological Comorbidity of Acute Respiratory Infection, Diarrhoea and Stunting among Children Under the Age of 5 Years in Somalia. International Statistical Review. 2017;85(1):164–76.
17. Ernawati F, Octaria Y, Widodo Y. Economic Status, Stunting and Diet Quality as Important Determinants of Anaemia among Indonesian Children aged 6–35 Months Old: A SEANUTS Study. In: Conference on Nutrition and Food 2020 (1st IPB ICNF 2020). 2020. p. 23.
18. Baye K, Laillou A, Chitweke S. Socio-Economic Inequalities in Child Stunting Reduction in Sub-Saharan Africa. Nutrients. 2020 Jan;12(1):253.
19. Alam MA, Richard SA, Fahim SM, Mahfuz M, Nahar B, Das S, et al. Impact of early-onset persistent stunting on cognitive development at 5 years of age: Results from a multi-country cohort study. PLOS ONE. 2020 Jan 24;15(1):e0227839.
20. Soekatri MYE, Sandjaja S, Syauqy A. Stunting Was Associated with Reported Morbidity, Parental Education and Socioeconomic Status in 0.5–12-Year-Old Indonesian Children. International Journal of Environmental Research and Public Health. 2020 Jan;17(17):6204.
21. Alderman H, Headey DD. How Important is Parental Education for Child Nutrition? World Development. 2017 Jun 1;94:448–64.