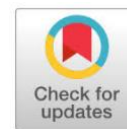


Stunting and development of toddler of 24-60 months: a correlation study



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ABSTRACT

Stunting is a problem that is being the focus of the government in Indonesia to be handled. Stunting is a result of chronic malnutrition which causes various long-term and short-term problems. If it occurs in stunting children, it can cause developmental disorders including subtle movements, rough motion, speech and language, and social independence. The purpose of this study was to determine the correlation between stunting and the development of toddlers aged 24-60 months. This study was an analytic observational study with a cross-sectional design. The population of this study has toddler aged 24-60 months and their mothers who came to the Integrated Services Post in the working area of the Gedangsari II Public Health Center Gunungkidul Regency in 2019 with a total of 52 samples that met the criteria. The instrument used was Z score to classified stunting and used Pre-Screening Development Questionnaire according to the age of the toddler to classified development. Bivariable data analysis used chi-square with significance level $p < 0.05$ and 95% CI and multivariable data analysis using logistic regression. Based on the results of the bivariable analysis showed a correlation between stunting and the development of children aged 24-60 months ($p = 0.017$). The statistical test on multivariable analysis of stunting with development domain was speech and language ($p = 0.425$; PR = 1.333; 95% CI = 0.276-21.228); smooth motion ($p = 0.769$; PR = 1.333; 95% CI = 0.220-7.851); social independence ($p = 0.001$; PR = 3.333; 95% CI = 0.013-0.354); and rough motion ($p = 1.000$; PR = 1.026; 95% CI = 0.976-1.078). There was a correlation between stunting and the development of toddler-aged 24-60 months and the most domain-related was social independence.

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INTRODUCTION

Stunting is a condition of failure to thrive in children under five due to chronic malnutrition, so children are too short for their age. Malnutrition occurs since the baby is in the womb and in the early days after the child is born, but only appears after the child is 2 years old.¹ Stunting in children reflects the condition of failure to develop in children under five (under 5 years) due to chronic malnutrition, so child becomes too short for his age.² Short toddlers are toddlers with nutritional status based on their length or height according to their age when compared to the standard WHO-MGRS (World Health Organization of Multicentre Growth Reference Study) standard in 2005. Short categories if the



z-score is less than -2SD and are categorized very short if the z-score is less than -3SD. In the Minister of Health Decree Number 1995 / MENKES / SK / XII / 2010 concerning Anthropometric Standards Assessment of Child Nutritional Status, short and very short terms are nutritional status based on Body Length according to Age (PB / U) or Body Height according to Age (TB / U) which is the equivalent of the term stunted (short) and severely stunted (very short).³

According to WHO in 2016, prevalence stunting toddlers in the world by 22.9% and circumstances short toddler nutrition is the cause of 2.2 million all causes of under-five mortality throughout the world. Nearly half the mortality rate in children under five years in Asia and Africa caused by malnutrition. This causes death three million children per year.⁴ In 2017, more than half the stunting toddlers in the world came from Asia (55%) while more than a third (39%) lived in Africa. Of the 83.6 million stunting children in Asia, the largest proportion came from South Asia (58.7%) and the lowest proportion in Central Asia (0.9%). Stunting prevalence data collected by the World Health Organization (WHO), Indonesia was included in the third country with the highest prevalence in the Southeast Asia / South-East Asia Regional (SEAR) region. The average prevalence of stunting toddlers in Indonesia in 2005-2017 it was 36.4%.⁵⁻⁶ The incidence of stunting (short) under five is a major nutritional problem facing Indonesia. Based on Nutrition Status Monitoring (Pemantauan Status Gizi/PSG) data for the past three years, short has the highest prevalence compared to other nutritional problems such as malnutrition, thinness, and fat. The prevalence of short toddlers has increased from 2016 which is 27.5% to 29.6% in 2017.⁷

The prevalence of short toddlers in Indonesia tends to be static. The results of the Basic Health Research (Riskesdas) in 2010 showed the prevalence of short toddlers in Indonesia at 35.6%. However, the prevalence of short toddlers increased again in 2013 to 37.2%. The prevalence of short toddlers will then be obtained from the results of Riskesdas 2018 which is also a measure of the success of the program that has been sought by the government. The Nutrition Status Monitoring survey was conducted as a monitoring and evaluation of program activities and achievements. Based on the 2015 Nutrition Status Monitoring results, the prevalence of short toddlers in Indonesia is 29%. This figure has decreased in 2016 to 27.5%. However, the prevalence of short toddlers again increased to 29.6% in 2017. The prevalence of toddlers is very short and short age 0-59 months in Indonesia in 2017 is 9.8% and 19.8%. This condition increased from the previous year, namely the prevalence of very short toddlers at 8.5% and short toddlers at 19%.⁷⁻⁸ The incidence of stunting in toddlers is more often about toddlers at the age of 12-59 months compared to toddlers aged 0-24 months. Stunting at an early age can increase several risks such as infant mortality, causes sufferers to get sick easily, has a posture that is not optimal, the cognitive abilities of sufferers are also reduced and as well as impaired motor and mental abilities.⁹

In the research in the working area of Kalasan Yogyakarta Public Health Center, it showed that stunting status had a significant relationship with child development including cognitive, language and motion development which was marked by OR 3.9. It means the possibility of children with stunting greater than 3.9 times suspect development compared to normal children.¹⁰ Another study conducted by Muhoozi et al. 2016 which examined children under five with stunting using ASQ (Ages and Stages Questionnaires) showed there were indications of delays in five domains development.¹¹ Whereas other studies in Thailand showed that 70 stunting toddlers 22.9% of them experienced developmental delays in general domain abilities including language (14.3%), gross motion (10.0%), social independence (5.7%) and smooth motion (2.9%). The highest prevalence of delay in men is 21.4% compared to women, namely 9.5%. Children aged 36-62 months who experience developmental delays.¹² Research by Ngure et al 2014 states that stunting can directly affect brain development and affect physical growth, motor development, and physical activity. Moreover, it can affect brain development in children through good parenting.¹³ In addition, according to Solihin et al 2013, the decline in motor function in stunting children is related to the low mechanical ability of the triceps surae muscle so that the late maturation of the muscle function causes motor skills in stunting children are also inhibited.¹⁴ Various studies on stunting have been carried out then this study aims to determine the correlation of stunting with four domain of development toddlers there are rough motion, social independence, speech and language, and smooth motion.

The problem of stunting (short child) is one of the nutritional problems facing the world, especially in poor and developing countries. Stunting is a health problem because it is associated with the risk of morbidity and death, suboptimal brain development, so that the development of late motion and mental growth is hampered. This is a serious threat to the existence of children as the next generation of a nation. Short children are predictors of the poor quality of widely accepted human resources, which further decreases the productive capacity of a nation in the future.¹³

Development (development) is increasing ability (skill) in the structure and function of the body that is more complex in a regular and predictable pattern, as a process of maturation. Here involves the process of differentiation of body cells, body tissues, organs, and organ systems that develop in such a way that each can fulfill its function. Including emotional development, intellectual and behavior because of interaction with the environment. In 2010 the growth and development disruption in children in Indonesia reached 35.7%. This number exceeds the World Health Organization (WHO) threshold of 30%. Indonesia is the fifth largest country with the highest stunting prevalence, more than one third of children under the age of five are below average. Toddlers who are stunting will have a level of intelligence that is not optimal, making children more susceptible to disease and in the future can be at risk of declining levels of productivity.³

The results of the preliminary study stated that the Yogyakarta Special Region prevalence of stunting in the last two years in Gunungkidul Regency continued to increase. In 2016 the prevalence of stunting in Gunungkidul Regency was 20.20% and then increased by 0.40% in 2017 (346 toddler). In addition to the prevalence of stunting, data from the DIY Provincial Health Office states that the lowest Detection Growth and Development (Deteksi Tumbuh Kembang Balita/DTKB) coverage in Gunungkidul District is among other districts / cities in DIY, of which 40,240 children under the age of inspection are only 16.8% (6,726 children). This can indicate that the Detection Growth and Development examination in Gunungkidul is not optimal especially for stunting toddlers.

Based on this background, the researchers were interested in conducting research on stunting relationships in the development of toddlers aged 24-60 months in the Gedangsari II Health Center area of Gunungkidul Regency in 2019. The purpose of this study was to determine the stunting relationship with the development of rough motion, subtle movements, language and social speech independence and know the developmental domain that is most related to stunting. The benefits of this study are expected to enrich empirical evidence, sources of information and references regarding the stunting relationship with the development of children aged 24-60 months.

METHODS

This type of research is an analytical survey with a cross sectional approach. The independent variables in this study were stunting toddlers while the dependent variable was the development of toddlers including rough motion, subtle movements, speech and language, and social independence. Characteristics of respondents studied included age, sex, height, mother's education, and mother's work. This research was conducted in the working area of Gedangsari II Health Center, Gunungkidul Regency in February until May 2019. The population in this study was stunting toddlers. The sample size is based on the formula for the great formula for cross sectional research by Lemeshow (1997) which is equal to 52 respondents. The inclusion criteria in this study were stunting toddlers aged 24-60 months who lived in the work area of Gedangsari II Health Center and were willing to become respondents.

In this study, stunting was categorized to be very short if the z-score was $<-3SD$ and short if z-score was $-3SD$ to $<-2SD$. The developmental variables of children under five are categorized as deviant, if the child cannot perform instructions according to KPSP with a score of ≤ 8 that is mapped according to the results of interpretation yes or no on each development domain and does not deviate, if the child can do KPSP instructions with a measurement score of 9-10. Data analysis is done using computer assistance. Univariable analysis to see the frequency distribution of each variable. Bivariable analysis with chi-square was used to determine the stunting relationship with development (rough motion, smooth motion, speech, and social independence) of children aged 24-60 months. Multivariable analysis used logistic regression to find out the most developmental domains related to stunting. This research has received research ethics approval from the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health Yogyakarta Number LB.01.01 / KE-01 / VIII / 370/2019 dated March 11, 2019.

RESULTS

The location of the study used the Gedangsari II Community Health Center Working Area in Gunungkidul Regency, namely in Sampang Village, Serut Village, and Watugajah Village. The researcher used proportional sampling that met the criteria to be used as a sample. The number of research samples was 52 toddlers aged 24-60 months divided according to the proportion of 11 toddlers from Sampang Village, 17 toddlers from Watugajah Village and 24 toddlers from Serut Village.

Table 1. Frequency Distribution of Research Subjects in Gedangsari II Health Center, Gunungkidul Regency

Variable	n	%
1. <i>Stunting</i>		
Severely Stunted	12	23,08
Stunted	40	76,92
2. Development Child		
Deviated	31	59,62
Not deviated	21	40,38
3. Age of Toddlers		
24 - 36 months	22	42,31
37 - 48 months	20	38,46
49 - 60 months	10	19,23
4. Sex		
Boys	29	55,77
Girls	23	44,23
5. Mother's Education Level		
Elementary	36	69,23
Middle	16	30,77
High	-	-
6. Mother's Occupation		
Not Work	38	73,08
Work	14	26,92

Based on the table above, there are 40 children under five in the short category (77%) and 31 children (60%) who experience developmental deviations. Most respondents were 29 male (56%). Most of the mother's education level in primary education (SD) is 36 people (69%) and those who don't work are 38 people (73%).

Table 2. Table of Stunting Relationships with Development of Toddlers aged 24-60 months in the Work Area of Gedangsari II Health Center, Gunungkidul Regency

Variable	Development of Toddlers				Total n	p-value
	Deviated		Not Deviated			
	N	%	N	%		
<i>Stunting</i>						
a. Stunted	20	50,0%	20	50,0%	40	0,017
b. Severely Stunted	11	91,7%	1	8,3%	12	
Total	31	59,6%	21	40,4%	52	

A total of 20 children (50%) in the short category experienced developmental deviations. Whereas for children with very short categories, there were 11 children (91.7%) experiencing developmental disorders and only 1 child whose development was appropriate. The statistical test results obtained p-value 0.017 which is less than 0.05 so it can be concluded that there is a relationship between stunting and the development of children aged 24-60 months.

Table 3. Table of Stunting Relationships with Development of Toddlers Ages 24-60 months in the Work Area of Gedangsari II Health Center, Gunungkidul Regency

Variable	Stunting				Total n	p-value
	Stunted		Severely Stunted			
	n	%	n	%		
Speech and Language Development						
Deviated	5	12,5	2	16,7	7	0,656
Not Deviated	35	87,5	10	83,3	45	
Smooth Motion Development						0,733

Variable	Stunting				Total n	p-value
	Stunted		Severely Stunted			
	n	%	n	%		
Deviated	13	32,5	3	25,0	16	
Not Deviated	27	67,5	9	69,0	36	
Rough Motion Development						
Deviated	1	2,5	0	0,0	1	1,00
Not Deviated	39	97,5	12	100,00	51	
Social and Independence Development						
Deviated	9	22,5	9	75,0	18	0,002
Not Deviated	31	77,5	3	25,0	34	

The percentage of children who experience irregularities in the speech and language domain is only 13.5%. The statistical test results show that stunting is not related to developments in the speech and language domain with a p-value of 0.656 which is more than 0.05. A total of 27 children in the short category have development in appropriate smooth motion. Furthermore, the results of statistical tests show that stunting is related not to the development of children in the smooth motion age domain with a p-value of 0.733 because p is more than 0.05. Children who do not experience irregularities in rough movements are 51 children, so only 1 child experiences irregularities in this domain. The results of statistical tests show that stunting is not related to the development of children in the coarse motion domain with a p-value of 1.00 ($p > 0.05$). Children who experience irregularities in social independence have a percentage of 34.6% (18 children). The results of statistical tests show that stunting is related to the development of children in the social domain of independence with p-value 0.002 ($p < 0.05$).

Table 4. Multivariable Analysis Results Table

Variable	B	p-value	PR	95% CI. for EXP(B)	
				Lower	Upper
Speech and Language	.884	.425	1.333	.276	21.228
Smooth Motion	.272	.765	.769	.220	7.851
Sosial Independence	-2.677	.001	3.333	.013	.354
Rough Motion	20.490	1.000	1.026	.976	1.078

The results of the statistical test on multivariable analysis of stunting were most related to the social development domain of independence p-value 0.001 ($p < 0.05$). Stunting toddlers are at risk of experiencing delays 3.3 times in developments in the social domain of independence.

DISCUSSION

The development of children who experience disorders or irregularities is found in stunting children with short categories. Measuring the development of this child using the Pre-Development Screening Questionnaire (Kuisiener Pra Skrining Perkembangan/KPSP) instrument adjusted for the child's age at this time. In this instrument there are several assessments of children's development which include subtle movements, rough movements, speech, and social independence. In development examination using Pre-Screening Development Questionnaire, it is said to be deviant if toddlers cannot carry out instructions according to Development Pre-Screening Questionnaire (Kuisiener Pra Skrining Perkembangan/KPSP) with a score of less than 8. Furthermore, it is said that development does not deviate if the toddler can perform Development Pre-Screening Questionnaire with the measurement score 9-10

The number of children with male sex who experience developmental disorders is more than children with female sex (62.1% compared to 56.5%). This is in line with the statement in a study that boys have 4 times the chance to experience developmental delays compared to girls. In the DDST II tool, the personal social development that assesses children's independence also allows girls to score better because of parenting and gender roles that emphasize girls to be able to do various tasks themselves such as those found in DDST II, namely imitating homework and helping

simple work.¹⁶⁻¹⁷ Other sources say that child development delays are more often found in boys. In boys the maturation and development of the left hemisphere of the brain associated with verbal function is less good compared to girls. If the development of the language is impaired, it is likely that social development will experience obstacles, because children will experience difficulties in how to communicate.¹⁶⁻¹⁸

In this study the characteristics of most of the mothers had basic education. Mothers who have primary level education have the highest percentage of children with deviant developmental disorders (63.9%) compared to mothers with secondary education (50%). On the deviation of child development in this study the deviant part is a part of social independence, subtle movement, and language speaking. This is in line with the statement that parental education is important in children's development. Maternal education greatly influences the acceptance of information about development and care for children.^{16,19-21} Another study stated that the higher the level of education of the mother, the better the development of children. Mothers with 7 years of formal education have children with better education. Low maternal education has a risk for delays in child development, because mothers do not yet know how to stimulate the development of their children. Mothers with higher education are more open to getting outside information about good ways to care for children, children's education, and ways to maintain children's health.^{16,19-21}

On the job characteristics of mothers of children with the occurrence of developmental disorders or deviations that mothers do not work daily have a higher percentage than mothers who work daily (73% compared to 27%). The 2013 study stated that there was no significant relationship between the work of the mother and the development of the child, because the one who had a greater contribution was the time of parenting.¹⁵ Other research which states that there is no relationship which means that the education of mothers with the growth and development of children aged 0-36 months in Sleman, Yogyakarta.²² Parental education is one of the important factors in children's development. Good education allows parents to receive all information from outside, especially about how to take good care of children, maintain children's health, education, and so on.¹⁶

There is no relationship between people's education parents, both fathers and mothers with motor development can be caused by child development not only influenced by parental education, but also the amount of support from the environment. Child's growth and development is influenced by the frequency and intensity of children's interactions with their environment. Quality and effective interactions will have a good impact. The attitude of parents is crucial for children's growth and development. Parents who are willing to accept the child's condition, provide support, and create an environment that is conducive to growth and development, will optimize the child's growth and development. Conversely, parents who are frustrated, stressed, feel sin, or reject the child, can inhibit the growth and development of children.¹⁶

Based on the results of the study it was found that the percentage of stunting children who experienced development deviated more than was appropriate (31 versus 21). The chi-square test results showed p-value 0.017 (<0.05) which means that stunting is associated with a deviation in child development. Furthermore, if tested with each developmental domain includes gross motion, subtle movements, speech, as well as social and independence, stunting has a dominant relationship with developments in the social domain and independence. This is indicated by the p-value of 0.002 (<0.05). This is the same in the multivariable statistical test, the developmental domain most associated with stunting is on social independence p-value 0.001 (<0.05). In addition, stunting children have a risk of 1.8 times experiencing developmental disorders and have the opportunity 3.3 times to experience irregularities in the social domain of independence.

In toddlers, the development of speech and language skills, creativity, social awareness, emotional and intelligence goes very fast and is the cornerstone of subsequent developments. Moral development and the foundations of a child's personality are also formed at this time. Stunting is a failure to achieve optimal growth, which not only affects the child's physical growth, but also cognitive development and other intelligence. For examples in the domain of gross motor development are related to the child's ability to make movements and postures that involve large muscles. Toddler stunting as research respondents can still make movements such as kicking a ball, sitting, standing. Furthermore, in the fine motor domain associated with the child's ability to make movements that involve certain body parts and performed by small muscles and requires careful coordination. They can also scribble on paper, draw straight lines, stack blocks.

In the ability to speak and language toddlers also there are no deviations. They are still able to respond to sound, talk, communicate, follow orders. But in this socialization and independence domain, stunting toddlers are starting to be seen to have deviations. This is an aspect related to the

child's independent ability (eating alone, cleaning toys after playing), separating from mother / child caregiver, socializing, and interacting with their environment, etc. In this domain examination, stunting toddlers will tend not to be able to do instructions on the questionnaire Pre-Development Screening. This is because children who experience stunting can cause children's curiosity to the environment to be lost. Less optimal intelligence development will result in disruption of children's emotional intelligence and loss of children's curiosity about the environment will hamper the child's social development process.^{13,17}

The results of this study are in line with the 2015 study which showed that seventy children with a short stature of 48% from SDQ (Strengths and Difficulties Questionnaire) had abnormal total scores. Short stature children often have problems with peers, so they are more likely to be alone than with children of their age, rarely having close friends, complaining often disturbed by their friends, and tend to be more comfortable playing with adults. Furthermore, children with short stature have less self-confidence and later result in difficulties in establishing friendships and are not easy to accept among their peers. This encourages children to behave aggressively or rather behave in the opposite way, children tend to be closed, peers avoided and increasingly withdrawn.²⁵

Stunting in children results from chronic malnutrition. The research conducted by Sutiarini stated that there was a relationship between nutritional status at birth and child development. Malnutrition at the time of baduta can result in brain cells decreasing 15-20% so that later in the future it will become a human with brain quality of around 80-85%, and disruption of mental development. Other studies have found that stunting children have a worse psychological function (more anxious and depressed) than non-stunting children.²⁶

CONCLUSION

Most experienced deviations from development, male sex, basic level mother education, and mothers did not work. Children with male sex, mother's level of education at the elementary level were found to have a percentage experiencing a higher developmental disorder or deviation. There is a relationship between stunting and the development of toddlers aged 24-60 months. Among the 4 domains of development of stunting are most related to the social domain of independence. In addition, stunting children have a risk of 1.8 times experiencing developmental disorders and have the opportunity 3.3 times to experience irregularities in the social domain of independence.

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