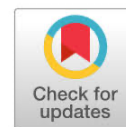


Motoric development of stunting and non-stunting on toddler



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ABSTRACT

Stunting is associated with the increased risk of sickness and death, slow motoric development, and the delay of mental growth. Stunting can lead to delays in motoric systems development, whether in normal children or in people with a certain disease. The decreased motor function in stunting children without congenital abnormalities related to the low mechanical capability of triceps muscles due to the slow development of muscle function. This research was conducted to know the difference in motor development of stunting and non-stunting in toddlers in the service area of Sentolo I Public Health Centre (PHC), Kulon Progo. This research uses analytical methods of observational with Cross-Sectional Study design. The subjects of this study are 110 stunting and non-stunting children. The samples were taken with consecutive sampling techniques. Methods of data used questionnaires and direct measurement using the height measuring instruments and Denver II sheets. The analysis applies to the chi-squared test. The results show 71.7% of children with stunting in the suspect category on fine motor development, 60.4% of the children with stunting in the suspect category on gross motor development. The results of the statistical test show the score of p-value 0.016 for children in the suspect category on fine motor development and p-value 0.014 for children in the suspect category on gross motor development. The p-value score is < 0.05, meaning there is a significant difference in motoric development stunting and non-stunting children in the service area of Sentolo I PHC, Kulon Progo.

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INTRODUCTION

Stunting is a problem that is commonly found in developing countries, especially Indonesia. Stunting is a very short body stature that exceeds -2 deficit of SD below the body median length or height. Stunted is a public health problem because it relates to the increased risk of morbidity and death, delay of motor development, and stunted mental growth.(1,2) Development is defined as the increase in the abilities (skills) of structures and more complex body function, in a regular and predictable pattern, as a result of the process of maturation / maturity. The following aspects of children development include: cognitive development, language, motor, emotions and behavioral development.(3)

The cases of stunting in the world according to the United Nations International Children's Emission Fund (UNICEF) in 2017 is 22.2% or 150.8 million children under the age of five in the world has stunting. Around 83.6 million of them are in Asia. In Southeast Asia, the cases of stunting in children under the age of five is 14.9 million children. Based on the results of monitoring the nutritional status of stunting percentage in children (underage of five) in Indonesia on 2017 was 29.6%. The prevalence of stunting children in the Special Region of Yogyakarta (DIY) in 2017 is 19.8%, the prevalence of stunting children in Kulon Progo Regency in 2017 is 16.38%. An increase of prevalence amounted to 1.51% compared to 2016 by 14.87%.(1,4-6)

Stunting can also cause stunted motor system development, both in normal children and with certain diseases. Decreased motor function of stunting children without congenital abnormalities is related to the low mechanical ability of the triceps muscle due to slow maturation of muscle function.(7)

At the age of 2-5 years, psychosocial aspects at this time are quite marked by the activities of children to talk, run, and start socializing. At this age the pattern of development is influenced by environmental, physical and psychological circumstances which cause different behavior of each child.(8) The golden age in motor development is middle childhood period (from age 6 to 12). At this age, the child's physical health begins to stabilize and does not experience stomachache as before. Physical development is closely related to the motor development of children. Motor is the development of controlling body movements through coordinated activities between the nervous system, muscles, brain and spinal cord. Motor development includes gross motor (body movements that use large muscles) and fine motor (movements that use smooth muscles).(9)

According to the data on 2017 from Health Office of Kulon Progo, there were 360 stunting children (25%) out of 1390 children in the service area of Sentolo I Public Health Center. The number is increased when compared with data from 2016 by 109 children (8.84%) of 1233 children.

The Research conducted in the Narahenpita area, Colombo on children aged 36-54 months shows gross motor skills, and fine motor skills in stunting children are lower than normal children.(10) Children aged 3-5 years have a range of longer relatively concentration range. The ability to think and solve problems is also growing. At this age, the development of motor skills is better.(9) According to research of Walker et al', there are similarities with current research. The results showed significant difference between stunting children in growth and development period (25.77 points; 95% CI: 210.68, 20.87 points; P = 0.022).(11) According to the research of Permatasari shows that the development of the children with stunting are the most in the suspect category with 67.60%, while non-stunting children are mostly in the normal category with 88.20%, which means there are significant growth and developmental differences between stunting and non-stunting children.(12) Research on children aged 1-3 years shows different results, i.e., there is no difference between the motor development between stunting and non-stunting toddlers.(13) The difference in previous studies is the age of five, where in toddlers aged 3-5 years the motor development is mature.

This study aims to determine the significant differences in fine motor development and gross motor skills in stunting and non-stunting children in the service area of Sentolo I Public Health Center Kulon Progo.

METHOD

This type of research is analytical observational research with cross sectional research design. The sample in this study is children aged 3-5 years in the service area of Sentolo I Public Health Center, Kulon Progo, who have met the inclusion and exclusion criteria. The inclusion criteria in this study are children aged 3-5 years and are not sick with infection / chronic at the time of the research. On the other hand, exclusion criteria in this study are children who have move outside the study area, children who have mental

retardation (down syndrome and autism), children who have chronic disease or in the period of treatment such as tuberculosis, leukemia and heart defects and children who refuse to do the test.

Primary data are obtained by direct measurement of children height using microtoice, measuring motor development of children using the Denver II sheet and children and parent's characteristic data are obtained from a questionnaire filled directly by parents of children at the time of the research. The Sampling is carried out by taking samples of children under five who meet the inclusion and exclusion criteria until it reach sufficient amount to the number of samples and the sampling technique used is consecutive nonprobability sampling is the selection of samples by determining subjects who meet the research criteria included in the study until a certain period of time, so that the number of clients needed is met.(14) The subjects in this study were 110 children. This research was conducted in May 2019 in the service area of Sentolo I Public Health Center, Kulon Progo. Data analysis is using Chi-square test, the collected data is analyzed to find out whether there are significant differences in motor development in stunting and non-stunting children. This study has received an ethical clearance from the Health Research Ethics Committee (KEPK) Poltekkes Kemenkes Yogyakarta No. LB.01.01/ke-01/VIII/361/2019 on March, 11th 2019.

RESULTS

Out of the 110 subjects who meet the inclusion and exclusion criteria of the study, there are stunting cases based on the parents and children's characteristic.

Table 1. Stunting cases based on characteristics of children and parents

Characteristics of Parents	Stunting cases			Total		
	Stunting	%	Non-Stunting	%	n	%
Mother's Occupation						
No	30	56.6	44	77.2	74	67.3
Yes	23	43.4	13	22.8	36	32.7
Family Income						
<UMK	38	71.7	32	56.1	70	63.6
≥UMK	15	28.3	25	43.9	40	36.4
Mother's Education						
Elementary School	5	9.4	7	12.3	12	10.9
Middle School	15	28.3	14	24.6	29	26.4
High School	31	58.5	34	59.6	65	59.1
College	2	3.8	2	3.5	4	3.6
Characteristics of Children						
Toddler Sex						
Male	26	49.1	21	36.8	47	42.7
Female	27	50.9	36	63.2	63	57.3
Participation Early Childhood Education						
No	22	41.5	15	26.3	37	33.6
Yes	31	58.5	42	73.7	73	66.4
History of Exclusive Breastfeeding						
No	23	43.4	24	42.1	47	42.7
Yes	30	56.6	33	57.9	63	57.3

Based on table 1, it is known that out of 110 subjects' parents, there are 74 of the subjects' parents who do not work (67.3%), 70 of subjects' parents (63.6%) have income less than Regional Minimum Wage (UMK), 65 subjects' parents (59.1%) with High School Education (SMA). As for the subject characteristic, out of the 63 subject (57.3%) are female, 73 subjects (66.4%) attended Early Childhood School (PAUD) and 63 subjects (57.3%) with a history of exclusive breastfeeding.

Table 2. Differences in Motor Development of Stunting and Non-Stunting Children in the Service area of the Sentolo I Public Health Center, Kulon Progo

Variable	Fine Motor				Total		Gross Motor				Total	
	Suspect		Normal				Suspect		Normal			
	n	%	n	%	N	%	n	%	n	%	n	%
Stunting	38	71.7	15	28.3	53	100	32	60.4	21	39.6	53	100
Non-Stunting	27	47.4	30	52.6	57	100	20	35.1	37	64.9	57	100
Total	65	59.1	45	40.9	110	100	52	47.3	58	52.7	110	100
P-Value	0.016						0.014					
(95% CI)	(1.275-6.216)						(1.300-6.112)					

In table 2, the research results note that the majority (71.7%) of stunting children subjects in fine motor within suspect category and as many as (60.4%) stunting children subjects in gross motor within suspect category. Hypothesis testing with Chi-Square obtained p value of 0.016 in fine motor category and 0.014 in gross motor category with that both p values (<0.05). This shows that statistically there are significant differences in motor development between stunting and non-stunting children in the service area of Kulon Progo Sentolo I Public Health Center.

DISCUSSION

Characteristics of Toddlers and Parents

Characteristics of toddlers and parents in a study conducted in the working area of the Sentolo I Health Center in Kulon Progo included the work of mothers who were mostly unemployed or as many as 74 subjects (67.3%). Mothers not working in carrying out their role in stimulating child development will be easier to develop creativity in carrying out activities with children so that a positive impact on children's development in accordance with the stage of his age. Based on the results of research on differences in the development of toddler age children (1-3 years) found that there is a significant relationship between mothers who do not work with child development is a value of 0.04 or α 0.05.(15)

Parental income on the characteristics of the subjects of this study were found as many as 70 subjects (63.6%) with income less than the Minimum Wage of Kulon Progo Regency. Pantaleon research results show that there is no significant relationship between parental income and motor development of under two children with a value of $p = 0.440$.(16) Adequate family income will support the growth and development of children, because parents can provide all the needs of both primary and secondary children.(17)

The absence of a relationship between family income and child motor development can be caused by most parents have been able to meet the primary needs of children, namely energy and protein intake, which is known to have a relationship with motor development of children under two years old.(16)

In the characteristics of mother's education, most of the level of education is high school / equivalent of 65 subjects (59.1%). In a study conducted by Pantaleon in Bantul Yogyakarta, it was found that there was no significant relationship between maternal

education and motor development in children under two years with a value of $p = 0.663$.⁽¹⁶⁾ Parental education is one of the important factors in children's growth and 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.⁽¹⁷⁾

In this study the most sexes were 63 female subjects (57.3%) while the male sex was lower. Toddlers with PAUD participation were 73 subjects (66.4%) and toddlers with a history of exclusive breastfeeding were 63 subjects (57.3%). Chi square test results (X^2) in this study, showed differences in fine motor and gross motor development between stunting and non-stunting toddlers (p values 0.016 and 0.014). The same results were also obtained in the research Solihin, Anwar & Sukandar stated that there is a relationship between the nutritional status of TB / U with one aspect of development that is cognitive development in preschool children.⁽⁷⁾ Research conducted by Pantaleon, Hadi, & Gamayanti also states that there is a significant relationship between stunting toddlers and one aspect of development, namely motorics. Stunting children are at risk of experiencing 11.98 times more likely to experience motor development delays.⁽¹⁶⁾ In contrast to the study analyzing the cross-sectional baseline data the Randomized Controlled Trial (RCT) study was conducted in Surakarta Urban Slums with a total sample of 86 children showing no difference in gross motor development in children with short and not short weight. Whereas for fine motor development in children with short and not short body weight there are differences.⁽¹³⁾

Stunting at the age of under five can cause various developmental disorders, including motor, cognitive, language, and social personal development. Because at the age of five years, vital development occurs in all parts of the brain that affect motor development, cognitive, and socio emotional.⁽¹⁸⁾ Research conducted in China shows that 55% of children experience deviations in the gross motor development sector, 40% in language development, 43% in social personal development and 28% in fine motor development.³⁸ Research conducted in Bhubaneswar and Cuttack India shows different results, where developmental deviations occurred more in the language sector (52.1%), fine motor (32.9%), personal social (26.1%), and gross motor skills (16.4%).⁽¹⁹⁾

The Relationship Between Stunting and Children's Motor Development

The results of the Denver II screening test in this population showed the most suspicious results in both aspects, namely gross motor and fine motorized infants. Where there are 31 (57.4%) gross motor suspects in stunting toddlers and 44 (81.5%) fine motor suspects in stunting toddlers. So it can be seen that stunting toddlers have the potential to experience motor development delays.

Motor development is greatly influenced by brain organs. The more eyes the development of the nervous system of the brain that regulates muscles allows the development of competence or motor skills of children.⁽⁹⁾ The low motor ability in stunting children is a result of the inhibition of the process of muscle maturity so that the mechanical ability of the muscles is reduced.⁽⁷⁾ Research conducted in Bogor shows that the nutritional status of toddlers has a positive relationship with the development of gross motor toddlers with a p value of 0.025 ($\alpha = 5\%$). Increasing the nutritional status of children under five, increasing the gross motor development. Besides being influenced by nutritional status, gross motor development is also influenced by fine motor development. Every additional one percent of the level of toddler fine motor development will increase the level of gross motor development of toddlers by 0.46%.⁽⁷⁾

Gross and fine motor development, develop simultaneously in varying degrees depending on the specific experience experienced by children with their environment. The development of these two developments, children will be increasingly able to combine various abilities to produce more complex motor skills. The existence of disruption in one developmental sector in stunted children can result in stunted development in other sectors, as well as hampering the child's ability to produce more complex motor skills.⁽²⁰⁾

In the research conducted at Sabana Sari Kindergarten the interaction between parents in this study can affect the child's development, this can be seen from the children with suspect results (52.8%) who rarely interact with parents / guardians more than children who get normal results (30.34%) which also rarely interact with parents.(21)

Similar research results conducted by Solihin, Anwar and Sukandar stated that there is a relationship between the TB/U based nutritional status with one aspect of development, namely cognitive development in preschool children.(7) Research conducted by Pantaleon, Hadi, & Gamayanti also states that there is a significant relationship between stunting children and one aspect of development, motoric. Stunting children are at risk 11.98 times greater of experiencing delay in motor development.(16) In the Permatasari and Sumarmi studies, there is a significant difference in the developmental variables of stunting and non-stunting children at age 24-36 months ($p = 0.01$). (12)

A similar study by Miller (2000) shows that 55% of children experienced irregularities in gross motor development sector, 40% in language development, 43% in social personal development and 28% in fine motor development.(22) Similar results are also carried out by Solihin, et al (2013) which indicates that the nutritional status of children shows a positive relationship with the gross motor development of children with p value of 0.025 ($\alpha = 5\%$). The nutritional status of children is directly proportional with the gross motor development of children. Besides being influenced by nutritional status, gross motor development is also influenced by fine motor development. Every addition of one percent at children fine motor development level will increase the level of gross motor development of children by 0.46%.(7)

CONCLUSION

The conclusion of the study, from 110 subjects's parents most of them are unemployed mother (67%) with income mostly below Kulon Progo's regional minimum wage (63,6%), and most of them reach senior high school (SMA) or equal educational background (59,1%). Moreover, majority of the subjects are girls under 5 years old (57,3%) who have attended Early Childhood Education School (PAUD) (66,4%) and about 57,3% have history of exclusive breastfeeding. There is significant correlation between motoric development of stunting children and non-stunting children.

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