

## Stunting is not associated with attention deficit hyperactivity disorder (ADHD) in children 36-59 months

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### ABSTRACT

**Background:** Based on national health survey 2013, the prevalence of stunting was 37.2% in Indonesia. Stunting is a chronic malnutrition that cause linear growth impairment in children. Stunting can give effect on Intelijent votient, cognitive, motoric, and emotional development. One of emotional development associated with stunting was Attention Deficit Hyperactivity Disorder (ADHD).

**Objectives:** To determine the relationship between stunting and ADHD in children aged 36-59 months in Sedayu Subdistrict, Bantul District, Yogyakarta.

**Methods:** This study used a cross-sectional design. Participants were 185 children selected by probability proportional to size (PPS) sampling technique. Variable examined included stunting and ADHD. Questionnaires used were structured questionnaire and ADHD early detection form. Data analyses used descriptive statistics and chi-square analysis at the level of significance 0.05.

**Results:** The prevalence of stunting in this study was 34.2%, meanwhile the prevalence of ADHD was 28.8%. Chi-square analysis showed no significant association between stunting with ADHD (OR=0.98; 95%CI: 0.50-1.91).

**Conclusion:** There is no association between stunting and ADHD in young children.

**KEYWORDS:** stunting, hyperactivity, ADHD, children

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### INTRODUCTION

Growth disorders such as chronic malnutrition will cause the child's linear growth disturbed to become stunting. Stunting is the height of the child does not meet the standard height according to age that is less than -2 standard deviation (1). Based on the Basic Health Research Results of 2013, the prevalence of stunting is 37.2% (3). Based on data from Paramashanti mentioned that the prevalence of stunting in children aged 6-23 months in rural area 38.20% while in urban 31.8% (4). Prevalence of child stunting age 6-23 months in Sedayu own reach 30.5% (5).

In the Health Law No.23 / 1992 article 17 paragraph (2) which regulates the implementation of child health, mentions the improvement of children's health done since in the womb, infant, toddler age, preschool and school age (RI Health Act no. 23 of 1992, article 17). Toddler period is an important period in the process of human

development. Growth and development at that time became the determinant of the success of growth and development of children in the next period, the period of growth and development at this age is a period of rapid progress and will never be repeated because it is often called the Golden Age (6). According Urip, children under five divided into 2 categories namely children aged 1-3 years (toddler) and pre-school children (7).

The development of a child includes not only the development of the motor, personal and social sectors, but emotional and behavioral developments have an important role to play. There are various kinds of emotional and behavioral problems such as attention and hyperactivity disorder (ADHD), and problems with peers. Children with various types of emotional and behavioral problems will cause disruption to themselves and the surrounding environment (8). Attention to the importance of the age period of children under five as a critical period for the development of children, especially the

critical phase of emotional development in Indonesia is not optimal (9).

One of the problems in child's emotional development is ADHD. ADHD is a term used to describe average or above average children's intelligence with less mental development levels such as: no attention, no instinct and hyperactivity. The main cause of ADHD behavior has been continuous research by experts, according to Martin said there are several factors that cause hyperactive behavior: (1) neurologic factors, labor by forcep extraction, babies born under 2500 grams (BBLR) , mothers giving birth too young, mothers who smoke and drink; (2) genetic factors, about 25-35% of parents and siblings whose hyperactive childhood will decline in children; (3) dietary factors, dyes, preservatives and vitamin deficiencies; (4) psychosocial and environmental factors; (5) Patterns of parenting such as child pampering, lack of discipline and supervision (10).

A study by Walker et al suggests that short stunting or stunting is one form of chronic nutritional disorder that is thought to cause various emotional problems, such as attention disorder, hyperactivity, and behavioral disorders in children (11). In addition, other studies conducted by Fred Ottoboni and Alice Ottoboni show evidence of ADHD due to lack of nutrients DHA and omega 3 and possibly other fatty acids (12). Previous research shows the percentage of toddler stunting in Sedayu but there is no further research on its impact, the percentage of stunting toddler problem is in 2014 equal to 18.48% and year 2015 equal to 16.52% despite the decrease in year 2015 we expect stunting problem can be minimized since the main impact of stunting is a non-optimal growth, therefore this research is important to implement in order to know the stunting relationship with ADHD.

## MATERIALS AND METHODS

This study was observational analytic with cross-sectional study design. This study was conducted at Posyandu in Sedayu sub-district, Bantul District, Special Region of Yogyakarta in February 2017. The population of this study were all children aged 36-59 months in Sedayu sub-district. The sampling technique

was probability proportional to size. The inclusion criteria in this study were children: 36-59 months old toddlers, toddlers who could be measured both body weight and height and were willing to be respondents as evidenced by informed consent form, while exclusion criteria from this study were toddlers who were absent when the research was conducted. The ethical clearance number of this research is KE/AA/II/79/EC/2017.

The independent variable in this study is stunting and the dependent variable is ADHD. The research instrument is microtoise questionnaire. The questionnaire used is a structured questionnaire that has been tested for its validity and reliability. The data on hyperactivity was taken using the Abbreviated Conners rating Scale questionnaire which is one of the Early Detection Tumbuh Kambah Kembangan forms from the Indonesian Ministry of Health which is regularly used in puskesmas. Enumerator is a nutrition student from the Department of Nutrition Science, Faculty of Health Sciences, Universitas Alma Ata, while the supervisor is a lecturer with a psychology background that determines the status of the diagnosis of hyperactivity.

Analysis using Stata software includes univariable, bivariate, multivariate and stratified analyzes. Bivariate analysis using Chi-Square. All analyzes were performed with a 0.05 level of significance.

## RESULTS

This study was followed by 185 samples of children aged 36-59 months located in District Sedayu Bantul regency, Yogyakarta. But among them in the execution because the data obtained is not complete. Characteristic description of respondents as shown in **Table 1**.

Based on **Table 1**, the sex of the respondents was more in men (51.4%) than women (48.6%). For the distribution of respondents age split most at the age of 36-47 months that is equal to 61.08%. While the age distribution of the respondent's mother was the highest at age  $\geq 30$  years that is 64.32% and the age distribution of father of the highest respondent at age  $\geq 30$  year that is 76.76%. As for the work of the parents of the respondents, the highest percentage

**Table 2. Distribution of frequency characteristics of respondents**

Variables	Total (n)	Percentage (%)
Sex		
1. Female	90	48.6
2. Male	95	51.4
Age (months)		
1. 36-47	113	61.08
2. 48-59	72	38.92
Mother's age (years)		
1. < 30	66	35.68
2. ≥ 30	119	64.32
Father's age (years)		
1. < 30	43	23.24
2. ≥ 30	142	76.76
Mother's Occupation		
1. Government Employee	3	1.6
2. Private Employee	45	24.3
3. Farmer	1	0.5
4. Others	136	73.5
Father's Occupation		
1. Government Employee	8	4.3
2. Private Employee	102	55.1
3. Farmer	1	0.5
4. Others	74	40

of respondent's job is 73.5% while the highest percentage of respondent's job is private (55.1%).

**Table 3** shows the prevalence of children with attention and hyperactivity disorder (ADHD) in this study was 28.6%, while stunting reached 34.2%.

**Table 4** shows that there is no significant relationship ( $p=0.95$ ) between stunting and ADHD (OR = 0.98; CI95%: 0.50-1.91).

## DISCUSSION

The study sample is children aged 36-59 months. Children at that age are called preschoolers and are active consumers which means they can already choose the foods they like. In addition, at

**Table 3. Distribution of the main research variables**

Variables	Total (n)	Percentage (%)
ADHD	53	28.6
Stunting	63	34.2

this time the child has mixed with the environment or early childhood education (ECD) so that children experience some changes in behavior (5).

Concentration and hyperactivity disorder (ADHD) is the most common psychiatric problem found in children of this age (11). The proportion of ADHD in this study was 28.6%. This proportion is much larger than previous research conducted in Brebes (14.2%) and in Padang (8%) (5, 11). Based on direct observation at the research site, it is known that seen some children who are very prominent or dominant at the time in the environment of his friends in posyandu. The prominent stance in question is running around, spinning, talking excessively, ignoring when spoken to directly and not to be outdone by his friend so that objects or toys held by the theme is seized.

Another major variable studied was stunting. Stunting is one of the major public health issues in children. The prevalence of stunting in this study was 34.2%. This value is not much different from the prevalence of stunting in children aged 6-23 months (34.73%) in Sedayu District or in the underweight population (37.2%) in Indonesia (3-4).

In this study there is no relationship between stunting with ADHD in children. This is because ADHD is not only influenced by nutritional status but also the psychological stimulation of the family such as socialization of children with parents and the environment because the involvement of mothers and other family members will affect the child in achieving optimal development. Hyperactivity can be the result of remodeling the behavior of

**Table 4. Bivariable analysis of the relationship between stunting and ADHD**

Stunting	ADHD		Total n (%)	OR (CI 95%)	P value
	Yes n (%)	No n (%)			
Yes	18 (28.75)	45 (71.43)	63 (100)	0.98 (0.50-1.91)	0.95
No	35 (28.93)	86 (71.07)	121 (100)		

parents or the environment, parents in children with hyperactive disorders often give orders and have a negative interaction relationship (25). In children with adequate nutritional status, hyperactivity is associated with anatomical dysfunction of several areas of the brain, including the frontal lobe and basal ganglia (11).

ADHD is also caused by DHA deficiency and other types of omega-3 fatty acids during pregnancy, then causes birth defects that produce such hyperactivity disorder. Although some evidence suggests that ADHD is a manifestation of nutritional deficiency, the consensus suggests that the aetiology of ADHD remains unknown (11). The results of previous research indicate that stimulation programs in early childhood have a positive impact on the child's psychological stunting function. Stunting children receiving such stimulation are reported to have anxiety levels, depressive symptoms and self-esteem that are similar to normal nutritional status. However, this is not proven in dealing with hyperactive behavior (11). This suggests that the psychological function of the child in relation to hyperactivity has also been established since utero.

## CONCLUSIONS AND RECOMMENDATIONS

Distribution of respondents aged 36-59 month in Sedayu District by 34.24%, distribution of respondents of ADHD aged 36-59 month in Sedayu by 29.12% and there is no significant relationship between stunting and ADHD.

### For Puskesmas Officers

It is expected to perform early detection of children's growth and development of the whole periodically and with Psychologist assistance for measurement data grow more valid flower. Data from the early detection of growth and development are then documented and disseminated to related parties so that hyperactive prevalence can be known and monitored from time to time.

### For Respondent's Parents

It is expected that by knowing the risk of stunting on hyperactive disorder, the parents of the

respondent can improve the nutritional status of the child through adequate intake in terms of quantity and quality, as well as good parenting and stimulation in support of children's emotional development. In order to prevent hyperactivity disorder caused by stunting, the improvement of nutritional status needs to be done since the time of pregnancy, even since the preconception period.

### Next Researcher

is expected to conduct this research with case control design studies with cases are children who have been detected hyperactivity in the clinic or cardiac growing pediatric hospital, or cohort with the exposure group is the children who stunting then seen outcome hiperaktivitasnya. In addition, outcomes of other emotional disorders such as attention disorder and anxiety need to be seen in relation to stunting.

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