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“The Optimalization of Adolescent Health in The Era of SDGs”

INNA GARUDA HOTEL YOGYAKARTA,
INDONESIA
November 5th, 2017



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**INNA GARUDA HOTEL YOGYAKARTA,
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THE RISK OF OBESITY AND DEVELOPMENTAL DELAY IN 2-5 YEAR OLD STUNTED CHILDREN IN KANIGORO, SAPTOSARI, GUNUNG KIDUL, YOGYAKARTA

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ABSTRACT

Malnutrition has been known to be the disease burden of the world. Obesity in children has also shown a continuity to rise in tendency. This phenomenon happens to civilization with lower to lower-middle income. It was as stated by Basic Health Research/Riskesdas (2013), that the proportion of obese children in Indonesia was 11,9% and the number of stunted children has reached 35,6% prevalence. Milmanet *al.* (2015)suggested that stunted children have bigger risk to suffer obesity and several noninfectious diseases.

The purposes of this research is to figure out the risk of obesity in 2-5 year old stunted children in Kanigoro, Saptosari, Gunung Kidul, Yogyakarta. This observational epidemiology analytic study used the case control approach. The study was conducted in Kanigoro, Saptosari, Gunung Kidul, Yogyakarta. The data was gathered from March to June, 2017. This study performed 1:1 case and control groups comparison, which was 22 cases to 22 controls. Purposive sampling techniques was applied. The data for risk of obesity was gathered by finding out the z-score values of weight/height, while the data for stunting was gathered by finding out the z-score value of height/age. The bivariate analysis used a chi square test with 0,05 α . The result is a relationship between obesity and stunting or that stunting is a factor leading to obesity (pvalue 0,016). The data analysis showed OR = 4.66 (95% CI=1,299 – 16,761), which means that 2-5 year old children with stunting have 4 times risk to suffer obesity bigger than normal children. Suggestions: Future researchers are welcome to use this study as a reference to evoke the act of intervention to stunting reduction in 2-5 year old children, as the effect of obesity has begun since the early life.

Keywords: *Stunting, Obesity, Children*

INTRODUCTION

Malnutrition has been known to be the disease burden of the world. Malnutrition refers to a state of either deficiency or excess of nutrition¹. Obesity in children has also shown a steady increase of the tendency. This phenomenon happens in the civilization with lower to lower-middle income. It was as stated by Basic Health Research, that the proportion of obese children in Indonesia was 11,9%².

There were a number of researches pointing out that the stunted condition, obesity and several diseases, particularly the noninfectious diseases, were caused by genetics. It was then known for that there were not much to do to help improve or change the condition. However, scientific proofs of some studies of the best nutritional research departments in the world have shifted the paradigm. It was found out that the most important cause of stunted stature, obesity, noninfectious diseases, and other indicators of life quality are improvable living environment³.

It is known that the stunting condition in children may cause a cognitive and psychomotoric developmental disorder, and therefore the fall of productivity in adulthood⁴. There were also several factors, which were thought to be a contribution to the case of

stunted children, which are infant birth weight, history of infectious diseases in children, history of illness and diseases during pregnancy, the height of the parents, and the social and economical factor of the parents⁵. Linear growth impairment most likely is caused during the intrauterine period and the first several years of life and was caused by insufficient amount of nutritional intake and infections that often happen⁶. A study showed that there is an abnormal fat oxidation process in stunted children which causes obesity in the later years of life⁷.

The data gathered by Basic Health Research/Riskesdasin 2010 showed that the prevalence of stunted children in Indonesia had reached the number of 35,6% with 24-36 month old children suffered the higher risk, which was 41,4% prevalence⁸. The stunting prevalence was higher than the prevalence of malnutrition, which was 17,9%, and 13,3% prevalence of wasting, and 14% prevalence of overweight children.

The data gathered by Basic Health Research/Riskesdasin 2013 also showed a result where the prevalence of stunted children had increased to the number of 37,2%². The same happened to the prevalence of malnutrition, which was increased to the number of 19,5%. However, there was a decline in the prevalence in wasting in children, reaching 12,1% and in overweight children, reaching 11,9%. The children nutritional status prevalences based on height-for-age (height/age) in Yogyakarta were 10,2% for extremely stunted, and 12,3% for stunted stature. The children nutritional status prevalences based on weight-for-height were 2,6% for extremely wasting, 6,5% for wasting, 77,3% for normal, and 13,6% for overweight.

The data taken by Riskesdasin 2013 shows a rise in tendency for children with stunted and overweight nutritional status compared to the data taken in 2010. However, the overweight prevalences in all provinces of Indonesia are still above the "non-public health problem" range according to WHO standard, which is 10,0%. As for the number for healthy stunting prevalence according to WHO standard is 20%, which means there are still found health problems in all province on this matter. Therefore, it is important to study the risk of obesity and the developmental delay in 2-5 year old stunted children in Kanigoro, Saptosari, Gunung Kidul, Yogyakarta.

METHOD

This study is an observational study in the field of nutrition science in society, with case control study method using retrospective approach. The study was conducted in Integrated Service Health Post (Posyandu) in Kanigoro, Saptosari, Gunungkidul, Yogyakarta.

The target population of this study were 2-5 year old children who live in Kanigoro, Saptosari, Gunung Kidul, Yogyakarta. The minimum number of the required samples for the data was counted according to the number of samples required on paired control group for case study formula, with the level of significance at 95% ($Z_{\alpha}=1,96$), $OR=3$ so that the samples gathered were 13 children, with the sample ratio between the case and control groups was 1:1. To represent the 2-5 year old children suffering obesity in Kanigoro, Saptosari, Gunungkidul, the study gathered 22 children to be the case group. The sampling method of the study was based on consecutive sampling technique, by considering the inclusion criteria for children in their 2-5 year old of age, the mothers agreed to be the respondents the z-score value for weight-to-height was greater than 2 SD (for case group) and the z-score value for weight-to-height was between -2 SD and +2 SD (for control group). To determine the control group, age and gender were matched. The control group was chosen by the same origin or if they live nearby samples from the case group. Then, to further determine the control group, the study matched samples from the same age and gender as those of case group.

This study made the occurrence of stunting as its independent variable, which is categorized as being stunted (< -2 SD) and normal ($+2SD$ s/d -2 SD). The data on the stunting occurrence are gathered by measuring the children's height with 200 cm capacity

and 0,1 cm level of carefulness *microtoice*, then counting the z-score value for the height-for-age (TB/U) using the official WHO's software, that is antro 2005. The occurrence of obesity is made the dependent variable of this study, gathered by measuring the children's weight using 0,1 kg level of carefulness *seca* balance and height using 0,1 cm level of carefulness *microtoice*, and then followed by counting the z-score value of weight-for-height using the official WHO's software, called antro 2005, finally categorizing the data by overweight ($> 2SD$) and normal ($-2 SD \leq z \leq +2 SD$).

The first gathered data was the data for the obesity case on 2-5 year old children. Then, as the samples were determined for the case and control group based on the z-score value of their weight-for-height, the data on the characteristics of the subjects and the respondents, and the stunting case for the case and control group, were then gathered.

The univariate analysis was performed to describe each variable of the study. The data with normal distribution were analyzed by finding out the mean value, while the data with abnormal distribution were analyzed by finding out the median value. Bivariate analysis was performed to see the correlation between each variable and the chance of getting the risk (OR) between stunting and obesity, using chi square test.

RESULTS

There were 44 children as the samples of the data, consisting of 22 obese children and 22 healthy children. Based on the analysis using chi-square test, stunting was determined as a contribution to obesity in 2-5 year old children. Below in Tabel 1 is shown the results of bivariate test.

Table1. Risk of Obesity in 2-5 Year Old Stunted Children

Nutritional Status	Overweight Status				Total		OR 95% CI	P- value
	Overweight		Normal					
	n	%	n	%	n	%		
Stunting	14	63.6	6	27.3	20	45.5	4,667 1,299 – 16,761	0,033
Normal	8	36.4	16	72.7	24	54.5		
Total	22	100	22	100	44	100		

As it is shown in Table 1, there are 14 (63.6%) overweight children are also stunted. While in control group, there are 6 (27.3) of them stunted. With chi square test with $\alpha = 0,05$, it resulted in p-value 0,033. This shows a significant correlation between obesity and stunting, or as it is concluded, stunting contributes to the higher risk of getting obesity. The data analysis results in OR = 4.66 (95% CI=1,299 – 16,761), which means that 2-5 year old stunted children will suffer from obesity 4 times most likely than normal children.

DISCUSSION

The results of the study shows that malnutrition still causes problem for children. Malnutrition involves the nutrition deficiency and, in the other hand, there is a rise in the risk of children suffering obesity. These double problems in nutritional intake shows the high number of stunting aside of the rising number of obesity in children. This phenomenon is as just WHO stated, that one from three children in countries with low to lower-middle income suffers a stunted growth⁹.

Stunting becomes an important issue because chronic nutrition deficiency suffered is classified as cumulative and is a syndrome that may cause fat accumulation in the body, shrinking the lean body mass and the increase of the risk of getting a

hypertension^{2,9,10,11,12,13}

The results of the analysis show that stunted children have 4,66 times of risk to get overweight compared to children with normal height. An analysis of survey done in Arabic countries found the similar thing, that the Risk Ratio (RR) of overweight in children occurs from 2,14 to 3,85 times of chance¹⁴. As it is, the meaningful correlation between stunting and obesity in children is positive when the RR was around 1,7 to 7,8¹⁵

One of the causes of weight gain that correlates with stunted growth is the chronic nutrition deficiency that happens in the early life¹¹. The bad effect of stunted growth positively related to the feeding and the weaning process that shapes the food consumption routine and the eating habit in the later life¹⁶. A change of metabolism in stunted children happens in the whole tissue and the system¹⁷. This change involves energy saving as well as an effort to speed up the metabolism, so that this phenomenon may cause the stunted children to get abnormality in regulating food and higher proness in high fat diet¹⁵.

Some studies in the past have explained that giving food to children with nutrition deficiency is relatively easy, which may caused by little amount of fat that signals the brain to feel hunger¹⁸. Other studies also explained that weight gain in children in recovery process from the deficiency of nutrition usually happens 5-15 times more pronounced than it does in normal children¹⁹.

In healthy children, growth can be seen as something that happens as a respond to growth hormone and other growth factors. Through a certain metabolic condition, high proportion of bone and muscle growth happens in occurrence of fat gaining. On the contrary, when weight gain happens without the balance of many factors for growing, the process results in bone and muscle proportion bigger than fat and smaller than lean mass, which would form a new composition of adult tissue that cannot grow anymore²⁰.

This shows a significant weight gain in children with nutrition deficiency, causing overweight and less muscle tissue in children compared to healthy children in the same age who have never suffered from nutrition deficiency. The same result also happens in stunted children, where there is sharp increase in weight-for-height indicator but not in weight-for-age indicator. In stunted children, higher proness in weight gain in terms of weight-for-height indicator is found if they consume high fat food. In stunted children, obesity is likely caused by a change of metabolism when they suffered from nutrition deficiency.

CONCLUSION

The analysis shows that there is a significant correlation between stunting and obesity in children (p-value 0.033), and that stunted children has 4.67 times higher risk to suffer obesity compared to healthy children.

SUGGESTIONS

It is important to know the chance of stunted children to suffer obesity to be able to construct an appropriate diet, preventing the stunted children to suffer obesity in the later life. In addition, to prevent more children from suffering from double dilemma in terms of nutritional intake, it is important to get this restorative nutritional dietary program for children in the fast track as a precautionary act.

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