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Penulis : Diyah Arini, Dwi Ernawati

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Dr. Istas Pratomo, S.T., M.T.

NPP. 16081074

LPPM Universitas Nahdlatul Ulama Surabaya

Website : lppm.unusa.ac.id

Email : lppm@unusa.ac.id

Hotline : 0838.5706.3867

Paper 1

by Diyah Arini 1

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The Analysis On Protein Energy Supply Concerning Stunting Incidents In Young Children Under Five Year Old At Primary Care Unit Of Tanah Kali Kedinding Surabaya

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Diyah Arini, Dwi Ernawati

Stikes Hang Tuah Surabaya, Jl. Gadung No. 1 Surabaya, East Java, Indonesia
Pediatric Nursing, Stikes Hang Tuah Surabaya, Jl. Gadung No. 1 Surabaya, East Java
(diyaharini, dwiernawati)@stikeshangtuah-sby.ac.id

The most common problem infectious that can reduce energy and protein intake and could impact on stunting on toddlers. The highest prevalence of stunting among children under five in Surabaya city in 2016 is found at Tanah Kali Kedinding Primary Care Unit. The purpose of this study is to analyse the intake of protein energy to stunting events in toddlers. The design is cross-sectional approach with simple random sampling. The sample size is 71 children. The study population was toddlers age 2 – 5 years who are stunted. Independent variable are the status of infectious disease (diarrhea and RTI), economic status, energy and protein intake. The dependent variable was the incidence of stunting. Microtoise a 5 questionnaire used to measure the variables with multinomial logit approach. The results showed that there was a significant relationship between energy intake and incidence of stunting in toddlers with $p = 0.001$ and there was a significant correlation between protein intake with the of stunting in under five years, with $p\text{-value} = 0.006$. The primary prevention of stunting events is prenatal and postnatal maternal and infant intervention in the first 1000th days of life by meeting protein energy requirements.

Keywords : Energy, Protein, Stunting

INTRODUCTION

Toddler age is an important time in the process of growth of a person. The growth in this period is quick and could not be repeated, that is why this period is usually called as *golden age*, but in this period, toddlers tend to experience some sickness which may affect their nutritional status in the future. The problem which usually occur in this period is an infection that can reduce the nutritional intake of a toddler and one of the results of it is *stunting* (Soetjningsih, 2013). Hasil observasi dan wawancara dengan tenaga kesehatan di Puskesmas Tanah Kali Kedinding, Based on the result of the observation and interview with the health workers in Tanah Kali Kedinding health care, the main reason of the high number of stunting in this area is caused by low education factor (60% of the population are just middle school graduates), low-income jobs like street vendors and daily workers who their income is far below the minimum wage, only about 500 thousands to 1 million rupiahs per month. A lot of housewives need to find a job to increase their family's income, and it does affect

their provision of food, nutrient, and child care.

Basic Health Research noted that the prevalence of stunting is 37,2% nationally which means there is an increase compared to 2010 (35,6%) and 2007 (36,8%), which consisted of 18.0% very short and 19.2% short, that means there has been an increase of 1,6%. *Stunting* prevalence (TB/U) is higher than *underweight* prevalence or malnutrition (BB/U) (19,6%) and *wasting* prevalence or skinny (BB/TB) (5,3%) on toddlers in Indonesia (Kemenkes RI, 2013). One of three health care that has the highest *stunting* prevalence in Surabaya is Tanah Kali Kedinding health care which is 25,37%. In 2013, *stunting* prevalence in Tanah Kali Kedinding health care reaches 21,86% and it increased in 2014 to 22,69% and in 2015 it reaches 23,63%. On the last record of 2016, the *stunting* prevalence in that health care reaches 25,37%. Low energy intake has a risk of the incidence of stunting children 2.52 times higher than those with good or normal energy intake. While protein intake is <80% of Nutritional Adequacy Rate (AKG) has a risk of 6,4 times higher than children with

protein intake of ≥ 80 . BBLR children experience indigestion because their gastrointestinal tract has not work properly, as a result, the growth of BBLR babies will be disrupted and can cause *stunting* (Trihono dkk, 2015). WHO established interventions that can be used to overcome stunting are prenatal and postnatal intervention. Mother holds an important act in supporting the efforts to overcome the nutritional problem, especially in terms of family nutrition intake, from preparing the food, choosing the ingredients, and food choices. One of the important programs that needs to be done by health workers is Integrated Healthcare Center for toddlers. Health workers need to form the best cadre, the goal is that the implementation of education to mothers with children under five is effective and height measurements according to age are reported appropriately. The most important education is exclusive breastfeeding until the age of 6 months, and starting from age 6 months, babies need to be fed with breastfeed complementary foods (MP-ASI) and breastfeeding continues until the baby is 2 years or older. Education also includes the mother's behavior to be aware if there is a problem with the growth of her children, especially the height.

Based on the description above, researchers are interested to study the protein energy intake that affect the occurrence of *stunting* on toddlers in Tanah Kali Kedinding health care, Surabaya.

METODE

This research's design uses observational analysis with *Cross Sectional* approach. The population of this research are age 2-5 years toddlers who experience stunting in Tanah Kali Kedinding health care, Surabaya. The technique used is *Probability Sampling* with *Simple Random Sampling*. The number of samples in this research is 71 respondents. The *Independent* variable in this research are

infectious disease status (diarrhea and Upper respiratory tract infections), family economic status, and energy and protein intake. The dependent variable in this research is *stunting* occurrence. This research instrument using Microtoise was used to measure toddler height with accuracy of 0.1 cm and a questionnaire on the Diyah Arini study about the relationship between breastfeeding patterns and the frequency of diarrhea and ARI events in children 6-12 months in the Balongpanggang Gresik health care area (Arini Diyah, 2011). To find out the status of infectious diseases suffered by children under five as well as semi-quantitative food frequency questionnaire / FFQ (Food Frequency Questionnaire), furthermore, food intake data is processed using software. This research was analyzed using multinomial regression coefficients.

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RESULTS

Table 1. Distribution of Respondents based on toddler's age, father's height, mother's height, and toddler's length of birth on Tanah Kali Kedinding health care, Surabaya

Responden's Characteristics	Frekuensi (f)	Percentage (%)
Toddler's age		
2-3 years	31	43,7
3-4 years	25	35,2
4-5 years	15	21,1
Father's height		
≤ 150 cm	5	7,0
151-160 cm	25	35,2
161-170 cm	31	43,7
>170 cm	10	14,1
Mother's height		
≤ 150 cm	26	36,6
151-160 cm	37	52,1
161-170 cm	8	11,3
>170 cm	0	0
Number of toddlers in family		
< 2 toddlers	37	52,1
≥ 2 toddlers	34	47,9
Number of parent dependent		

children		
1 children	17	23,9
2 children	40	56,3
≥ 3 children	14	19,7
Toddler's length of birth		
≤ 45 cm	6	8,5
46-50 cm	49	69,0
51-55 cm	16	22,5
> 55 cm	0	0

Table 2 Distribution of Toddler Respondents Based on Stunting at the Tanah Kali Kedinding Health Center in Surabaya

Height	Frekuensi (f)	Percentage (%)
Stunting	57	19,7
Severe stunting	14	80,3
Total	71	100

Table 3 Distribution of Respondents Based on Infectious Disease Status at the Tanah Kali Kedinding Health Center in Surabaya

Infectious Disease Status	Frekuensi (f)	Percentage (%)
Positive	50	70,4
Negative	21	29,6
Total	71	100

Table 4 Distribution of Respondents Based on Family Economic Status at the Tanah Kali Kedinding Health Center in Surabaya

Family Economic Status	Frekuensi (f)	Percentage (%)
Low	50	70,4
Middle	20	28,2
High	1	1,4
Total	71	100

Table 5 Distribution of Respondents Based on Energy Intake at Tanah Kali Kedinding Health Center in Surabaya

Energy Intake	Frekuensi (f)	Percentage (%)
Low	44	62,0
Enough	27	38,0

Total	71	100
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Table 6 Distribution of Respondents Based on Protein Intake at Tanah Kali Kedinding Health Center in Surabaya

Protein Intake	Frekuensi (f)	Percentage (%)
Low	43	60,6
Enough	28	39,4
Total	71	100

Table 7 Distribution of Respondents Based on Measurement Results based on factors that influence the incidence of stunting in Tanah Kali Kedinding Health Center, Surabaya

Variable	Score	Sign
Infectious Disease Status	7,324	0,007
Family Economic Status	6,918	0,009
Energy Intake	10,701	0,001
Protein Intake	7,614	0,006

Table 8 Distribution of Respondents Based on Measurement Results based on the factors that influence the most of the incidence of stunting in Tanah Kali Kedinding Health Center, Surabaya

Var Dependent	Var Independent	p value	Exp(B)	95% C.I	
				Lower	Upper
Stunting	Infectious Disease Status	0,998	3x10 ⁸	0,001	
	Family economic status	0,998	6x10 ⁷	0,001	
	Energy Intake	0,998	3x10 ⁸	0,001	
	Protein Intake	0,120	65x10 ²	0,613	68,95

The results of multinomial regression coefficient analysis of the results of the last modeling conducted can be concluded from 4 factors that affect the incidence of stunting in the Tanah Kali Kedinding Public Health Center in Surabaya obtained that protein intake shows p value = 0,12 with OR 65x10² which means protein intake on toddlers has the risk factor of 65x10² times higher than other factors.

DISCUSSION

There is a meaningful relation between infectious disease which in this case are diarrhea and URI with the incidence of *stunting* on toddlers at Tanah Kali Kedinding health care, Surabaya, this can be seen from the p value = 0,007 ($p < 0,05$). The result of the research shows that there are 36 *stunting* toddlers and 14 *sever stunting* toddlers have experienced infectious disease (diarrhea or URI) in the past year. Infectious disease is one of the direct causative factors of toddlers' nutritional status beside food consumption. Children who do not consume the nutrition that is needed by the body will result in a child's low endurance, so they are susceptible to infectious disease, on the contrary, infectious disease like diarrhea and URI will result in the body cannot absorb the intake of nutrients that properly. Babies who get optimal nutrition and stimulation as needed can minimize the incidence of infectious diseases such as diarrhea and URI (Ernawati Dwi, 2014). Study of *stunting* in England shows the result of continuous analysis of diarrhea toward *stunting*. Based on children aged 24 months with continuous diarrhea for more than 14 days have a greater chance of experiencing *stunting* than children aged 24 months with those who have diarrhea for less than 14 days (Checkley et al., 2008).

Toddlers who frequently experience severe diarrhea will have higher risk to grow into *stunting*. During diarrhea the bacteria enter the small intestine and experience multiplication. Bacteria release toxins that will affect the small intestinal mucosal cells (stimulating the adenilsiklase enzyme). That enzyme changes Adenosine Tri Phosphat (ATP) into cyclic Adenosine Mono Phosphate (cAMP) and with the increase of cAMP there will be an increase in the secretion of Cl ions into the intestinal lumen. The secretion of isotonic solutions by the small intestine mucosa (hypersecretion) as a result of the formation of these toxins will make other

absorption functions of the intestinal mucosa disturbed (decrease in the amount of the saccharidase, lipase, and protease enzymes)(Almatsir & Sunita, 2011). Hal ini mengakibatkan malabsorpsi zat gizi, dehidrasi dan kehilangan zat gizi. Jika kondisi tersebut tidak segera ditangani dan diimbangi dengan asupan makan yang adekuat, maka akan timbul dehidrasi parah, malnutrisi dan gagal tumbuh. Diare berdampak terhadap pertumbuhan linear anak. Jika anak sering mengalami diare dalam kurun 24 bulan pertama kehidupan maka anak tersebut cenderung menjadi pendek 1,5 kali (Checkley et al., 2008). This will cause nutrient malabsorption, dehydration, and nutrient loss. If the condition is not treated immediately and balanced with adequate food intake, severe dehydration, malnutrition and failure to thrive will occur. Diarrhea affects toward the linear growth of children. If children frequently experience diarrhea in their first 24 months of life, then that children will be 1,5 times shorter (Checkley et al., 2008). Based on previous studies in the 20 largest countries in the world there were 80% of children who experience *stunting*, children who experienced malnutrition accompanied by diarrhea cases by 51%, cases of malaria by 57%, pneumonia cases by 52%, and cases of measles by 45% who end up dead (Hussein & Adam, 2015)

There is a significant relationship between family economic status with *stunting* incidence on toddlers at Tanah Kali Kedinding health care in Surabaya, this could be seen from the value of $p=0,009$ ($p < 0,05$). The result obtained shows that 36 *stunting* toddlers and 14 *sever taunting* toddlers came from parents with low family economic status. Research in Indonesia and Bangladesh shows that children from low economic families have a higher risk of *stunting* than children from higher socioeconomic families. This shows that the family economic situation affects the incidence of *stunting* on toddlers (Semba, 2016). Socio-economic factors including the income per capita, parental

education, mother's knowledge about nutrition also indirectly related to the incidence of stunting (Dian Hidayati, T. M. Thaib, 2010).

There is a significant relationship between energy intake with *stunting* incidence on toddlers at Tanah Kali Kedinding health care in Surabaya, this could be seen from the value of $p=0,001$ ($p<0,05$). The result obtained shows that 36 *stunting* toddlers and 14 *severe taunting* toddlers have low energy intake. The body that lacks energy will experience a negative energy balance so that the weight will be reduced from the actual weight. This will inhibit the growth of the children and causes weight loss and body tissue damage for adults (Siagian Albiner, 2010). A complete nutrient intake is still needed by children as long as their growth process is still on going, because this growth process is influenced by the food that are given to the children. The foods that are given should be exact in term of types, quantity, and nutrient content. The child's body still needs all the main nutrients namely carbohydrates, fats, proteins, fiber, vitamins and minerals, if it is deficient then the child's growth including height will be disrupted (Almatsier Sunita, 2011). Sufficient amount of nutrient is needed to guarantee an optimal growth of children. Daily nutritional needs are used to carry out and maintain the normal functioning of the body, it can be done by choosing and consuming good food (the quality and quantity) (Sutomo Anggraini, 2010).

Foods are the source of energy to support all kind of activities of people. The burning of carbohydrates, proteins, and fats produces energy in the human body. So in order to maintain the nutritional needs of human, they need to consume an adequate amount of food. Inadequate nutrient intake, especially from total energy, protein, fat and micronutrients, is associated with physical growth deficits in pre-school children (Almatsier Sunita, 2011). However, adequate diet consumption does not guarantee normal

physical growth, because the incidence of other diseases, such as acute or chronic infections, can affect complex processes for the occurrence or maintenance of growth deficits in children. 5 RISKESDAS data analysis in 2013 shows that there is a significant relationship between energy consumption and the incidence of *stunting* on toddlers aged 12 – 59 months in Sumatera (Kemenkes RI, 2013). There is a significant relationship between protein intake with *stunting* incidence on toddlers at Tanah Kali Kedinding health care in Surabaya, this could be seen from the value of $p=0,006$ ($p<0,05$). The result obtained shows that 30 *stunting* toddlers and 13 *severe taunting* toddlers have low protein intake. Stunting children in Malawi have serum concentrations of all 9 amino acids which are only 10-20 percent lower than non-stunting children. In addition, stunting children have significant low serum concentrations of the required amino acid conditions (arginine, glycine, glutamine), unneeded amino acids (asparagine, glutamate, serine), and 6 different sphingolipids compared to non-stunting children (Semba, 2016).

Other studies have shown that there is a relationship between type of consumption and the amount of food that can affect nutritional status and the end result appears stunting in toddlers as in Budiarti's research that the type and amount of food is related to the incidence of malnutrition in children under five in Posyandu Kenanga 3 Bulak Banteng Surabaya (Budiarti Astrida, Hastuti Puji, 2017) RISKESDAS showed the result of data analysis in different province, there is a significant relationship between protein consumption and the *stunting* incidence on toddlers (Kemenkes RI, 2013).

The 8 13 basic health research data consistently shows that the average calorie and protein intake of children under five is still below the Nutrition Adequacy Rate (RDA). As a result, female toddlers and 8 male toddlers have average height of each 6,7 cm and 7,3 cm shorter than WHO

reference standard in 2005. Protein is highly needed for the physical growth especially height, because protein is the main component of the bone. Protein is essential for the normal functioning of almost all cells and metabolic processes, thus deficits in these nutrients have many clinical effects (Kemenkes RI, 2013).

CONCLUSION

The analysis result showed the incidence of *stunting* in Tanah Kali Kedinding Health Care in Surabaya found that protein intake factor has a p value = 0,12 with OR 65×10^2 , means that toddler's protein intake has a risk factor of 65×10^2 times higher than infectious disease factor, family economic factor, and energy intake.

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