



THE CORRELATION BETWEEN ENERGY, PROTEIN, AND ZINK INTAKE AND HISTORY OF INFECTIOUS DISEASE WITH STUNTING CASE ON TODDLER IN TAMANSARISUB-DISTRICTS TASIKMALAYAIN 2016

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ABSTRACT

Tamansari district is one of areas in Tasikmalaya that has health problem; it can be seen by prevalence of malnutrition and less nutrition are quite high with stunting prevalence on toddler of 13,17%. The aim of this study wastoknowthe correlation between Energy, Protein, and Zink intake and History of Infectious Disease with stunting case on toddler in Tamansarisub-districts Tasikmalayain 2016. A case control study was conducted on toddler age of 7-59 months of 112 stunting toddler and 112 non-stunting toddler. The collected data is in form of energy, protein, and zink intake and history of infectious disease. Result Shows there was no significant difference in energy intake between stunting and non stunting group ($p > 0,05$). In other hand, there was significant difference in protein intake between two groups there value = 0,003. Moreover, there was significant difference in zink intake between two groups with p value = 0,000, and there was correlation between History of Infectious disease and stuntingon toddler with p value = 0,008 in Tamansarisub-districts Tasikmalaya. Protein and zink intake are protective factor and history of Infectious diseasebecomes risk factor of stunting case on toddler in Tamansarisub-district Tasikmalaya in 2016.

KEYWORDS: Energy, Protein, Zink, History of Infectious Diseaseand stunting toddler.

INTRODUCTION

Nutrition problem that mostly found on toddler in Indonesia is stunting, a growth disorder, that happened because of chronic malnutrition or chronic infection disease. According to WHO ChildGrowthStandard, stunting is based on body length index compared to age (BL/A) or height compared to age (H/A) by limit (Z-score) less than -2 SD (WHO, 2010). Stunting on toddler is a result fromlong term low qualitydiet consumption that is combined by morbidity, infection disease, and environment problem (Semba, 2008).

Malnutrition on toddler can cause low height growth so that he/she is shorter than the other who has normal nutrition status (Supariasa, 2012). According to Anugraheni 2012, the stunting toddler has risk of decreasing intellectual ability, productivity, and increasing of degenerative disease risk in the future.

Mostly, stunting case on toddler is correlated with the decrease of immune system which is susceptible on infection disease. The stunting toddler is more often suffered from disease that non-stunting one, and the infection that always attack some toddlers which become

the direct cause of nutrition problem is ISPA and diarrhea (Welasasih, 2012; Miko, 2002).

Based on data of Months of Toddler Weighing in 2014 in Tasikmalaya, index of W/A the prevalence of malnutrition and less-nutrition in Tasikmalaya is 0,92% and 7,11%.Tamansari districts is one of regions that possess quite high prevalence of them. Further, based on index of W/A, the prevalence of malnutrition toddler is 1,3% and less-nutrition is 9,6%. Thus, prevalence of stunting casein Tasikmalaya is located in Tamansari district; it is 13,17% (DINKES/Public Health Office TSM , 2014).

RESERACH METHOD

Type of research is observational analytical by using case control as study design, and it was conducted in Tamansarisub-district on July until October 2016. The population was mothers and stunting or non-stunting toddlers' age of 7-59 months by using total sampling as sample taking technique. Sample taken based on inclusion research sample criterion. They are (1). Toddler age of7-59 months, (2). Ready for being respondent. In the other hand, exclusion sample criterion is (1). The respondents are not in the location when the

data were taking. The amount of sample is 112 stunting toddler and 112 normal one, so grand total is 224 toddlers.

- a. Primary data include energy intake, protein intake, zink intake, and infection didease history. Also, toddler nutrition status is based on H/A or BL/A.
- 1) The data of energy, protein, and zink intake on toddler was taken by interview and completing the SQ-FFQ form.
 - 2) The data of History of Infectious Disease was taken by interview and questioner giving.
 - 3) Toddler nutrition status gained by antropometri measurement based on H/A or BL/A by using microtoise or APPB.

b. Secondary Data.

Secondary data is Months of Toddler Weighing report from Tamansari medical post for knowing the amount of stunting toddler age of 7-59 months.

Research result gained by collecting both primary and secondary data. Primary data produced by direct research related to toddler's characteristic and identity while History of Infectious Disease data (ISPA and diarrhea) which is suffering or has suffered by stunting toddler age of 7-59 months taken for a month started from questionnaire taking until KMS in Tamansari working area. Finally, data analyzed by applying univariate and bivariate analysis.

RESULT

The respondents' characteristic consist of mother and toddler. Mothers were grouped by age; the most one are in average of 20-34 years old (Table 1). Next, the parents' educational background is mostly Elementary school; mothers' education of case group is 59,8%, and control group is 42%, while fathers' education of case group is 63,4% and of control group is 54,5% (Table 2). Moreover, mothers' occupation is mostly housewife, 88,4% of case group and 91,9% of control group. Then, fathers' job is mostly laborer, 66,0% of case group and 83,00% of control group (Table 3).

Table 1: The Characteristics Distribution of Mother's Age.

Mother's Age	Group			
	Stunting		Non-stunting	
	N	%	N	%
15-19 years old	2	1,8	1	0,9
20-24 years old	31	27,7	27	24,1
25-29 years old	26	23,2	32	28,6
30-34 years old	24	21,4	27	24,1
35-39 years old	15	13,4	16	14,3
40-44 years old	7	6,2	8	7,1
45-49 years old	4	3,6	1	0,9
> 50 years old	3	2,7	0	0
Total	112	100	112	100

Table 2: The Characteristics Distribution of Parent's Education.

Parent's Education	Group			
	Stunting		Non-stunting	
	N	%	N	%
Mother's Education				
• University	2	1,8	21	18,8
• Senior High School	20	17,9	18	16,1
• Junior High School	23	20,5	25	22,3
• Elementary School	67	59,8	47	42
• Non-School	0	0	1	0,9
Total	112	100	112	100
Father's Education				
• University	3	2,7	4	3,6
• Senior High School	20	17,9	18	16,1
• Junior High School	18	16,1	27	24,1
• Elementary School	71	63,4	61	54,5
• Non-School	0	0	2	1,8
Total	112	100	112	100

Table 3: The Characteristics Distribution of Parents' Occupation.

Parent's Occupation	Group			
	Stunting		Non-stunting	
	N	%	N	%
Mother's Job				
• House wife	99	88,4	103	91,9
• Civil Servant	0	0	1	0,9
• Private Employee	2	1,8	1	0,9
• Laborer	7	6,2	6	5,4
• Entrepreneur	2	1,8	1	0,9
• Services (Tailor, Salon)	2	1,8	0	0
Total	112	100	112	100
Father's Job				
• unemploy	1	0,9	2	1,8
• Civil Servant	2	1,8	1	0,9
• Private Employee	6	5,4	3	2,7
• Laborer	75	66,0	83	83,0
• Entrepreneur	23	20,5	19	17
• Services (Tailor, Ojeg, Driver)	5	4,5	4	3,6
Total	112	100	112	100

Toddler's gender in case group consist of boy 55,4% and girl 44,6%; while the same percentage of both boy and girl in control group produced 50% (Table 4). In case group, the least ages are age of 6-11 months or 11,6%, yet the most one are in age of 36-59 months or 34,8% (Table 5). Nutrition status measurement in case group of toddler with very short term nutrition status is 24,1%, and short term is 75,9%. In other hand, control group produced 98,2% of normal nutrition status, and high status is 1,8% (Table 6).

Table 4: The Characteristics Distribution of Toddler's Gender.

Gender	Group			
	Stunting		Non-stunting	
	N	%	N	%
Boy	62	55,4	56	50
Girl	50	44,6	56	50
Total	112	100	112	100

Table 5: The Characteristics Distribution of Toddler's Age.

Age	Group			
	Stunting		Non-stunting	
	N	%	N	%
7-11 Months	13	11,6	13	11,6
12-23 Months	27	24,1	39	34,8
24-35 Months	33	29,5	31	27,7
36-59 Months	39	34,8	29	25,9
Total	112	100	112	100

Table 6: The Characteristics Distribution of Toddler's Nutrition Status. (H/U or BL/A).

Toddler's Nutrition Status (H/A atau BL/A)	Group			
	Stunting		Non-stunting	
	N	%	N	%
Very Short	27	24,1	0	0
Short	85	75,9	0	0
Normal	0	0	110	98,2
High	0	0	2	1,8
Total	112	100	112	100

The energy intake of case group mostly includes severe deficit category, 59,8%, and the least is mild deficit 5,4%. In control group, the energy intake of toddler is mostly severe deficit 29,5%, versa, over necessity category become the least one, 9,8% (Table 7).

Next, protein intake of case group is severe deficit category, 59,8% while mild deficit produces 5,4%. Control group produces 29,5% of severe deficit category, and over necessity category is 9,8% (Table 8).

In addition, zink intake of case group in severe deficit category is 43,8% and mild deficit is 8,9%. Then control group gains over necessity category 34,8%, and moderate deficit is 8% (Table 9).

At last, History of Infectious Disease of both case group and control group that have more History of Infectious Disease is more than 72,3%, and non-infection history is less than 27,7% (Table 10).

Table 7: The Characteristics Distribution of Energy Intake.

Energy Intake	Group			
	Case		Control	
	N	%	N	%
Over Necessity	9	8	11	9,8
Normal	21	18,8	21	18,8
Mild Deficit	6	5,4	31	27,7
Moderate Deficit	9	8	16	14,3
Severe Deficit	67	59,8	33	29,5
Total	112	100	112	100

Table 8: The Characteristics Distribution of Protein Intake.

Protein Intake	Group			
	Stunting		Non-stunting	
	N	%	N	%
Over Necessity	33	29,5	46	41,1
Normal	23	20,5	32	28,6
Mild Deficit	13	11,6	5	4,5
Moderate Deficit	15	13,4	10	8,9
Severe Deficit	28	25	19	17
Total	112	100	112	100

Table 9: The Characteristics Distribution of Zink Intake.

Zink Intake	Group			
	Case		Control	
	N	%	N	%
Over Necessity	28	25	39	34,8
Normal	14	12,5	31	27,7
Mild Deficit	10	8,9	16	14,3
Moderate Deficit	11	9,8	9	8
Severe Deficit	49	43,8	17	15,2
Total	112	100	112	100

Table 10: The Characteristics Distribution of Toddler's Infection.

Infection History	Group			
	Stunting		Non-stunting	
	N	%	N	%
Yes	97	86,6	81	72,3
No	15	13,4	31	27,7
Total	112	100	112	100

The Correlation of Energy Intake and Stunting Case

The proportion of less energy intake between case group (stunting) and control group (non-stunting) is almost the same. It was approved by *Chi Square* test result with p value >0,05 that shows no proportion distinction; OR value is 0,915 (0,51-1,64) (Table 11).

The Correlation of Protein Intake and Stunting Case

The proportion of protein intake that is deficit of stunting group (62,2%) is bigger than non-stunting one (37,8%). Statistics resulted p value <0,05 which meant there is meaningful proportion distinction between stunting and

non-stunting by OR value 0,44 (0,252 -0,753) (Table 12).

The Correlation of Zink Intake and Stunting Case

Statistics test resultsp value = 0,000 ($p < 0,05$), Zink intake proportion of case group (62,5%) that less than Nutritional Adequacy Rate (NAR) is bigger than control group. *Chi Square* test shows p value $< 0,05$ that there is meaningful distinction between case group and control one (Table 13).

The Correlation of History of Infectious Disease and Stunting Case

Research result of Statistic test gained p value = 0,008 ($p > 0,05$); it means there is a meaningful correlation between History of Infectious Disease and stunting case on toddler in working area of Tamansari Medical Post. The proportion of ISPA history of case group (54,5%) is bigger than control one (45,5%). This was approved by $p < 0,05$ means there is proportion difference between case group and control one; Odd Ratio value 2,48 (1,23-4,90) (Tabel 14).

Table 11: The Correlation of Energy Intake and Stunting Case on Toddler.

Energy Intake	Group				OR (95% CI)	P Value
	Stunting		Non-Stunting			
	N	%	N	%		
Normal	30	48,4	32	51,6	0,915 (0,509-1,643)	0,765
Deficit (Less)	82	50,6	80	49,4		
Deficit	112	100	112	100		

Table 12: The Correlation of Protein Intake and Stunting Case on Toddler.

Protein Intake	Group				OR (95% CI)	P Value
	Case		Control			
	N	%	N	%		
Normal	56	41,8	78	58,2	0,436 (0,252-0,753)	0,003
Deficit (Less)	56	62,2	34	37,8		
Total	112	100	112	100		

Table 13: The Correlation of Zink Intake and Stunting Case on Toddler.

Zink Intake	Group				OR (95% CI)	P value
	Case		Control			
	N	%	N	%		
Normal	42	37,5	70	62,5	0,360 (0,210-0,618)	0,000
Deficit (Less)	70	62,5	42	37,5		
Total	112	100	112	100		

Table 14: The Correlation of Infection Disease and Stunting Case on Toddler.

Infection History	Group				OR (95% CI)	P Value
	Case		Control			
	N	%	N	%		
Yes	97	54,5	81	45,5	2,48 (1,250-4,902)	0,008
No	15	32,6	31	67,4		
Total	112	100	112	100		

DISCUSSION

Respondents' characteristic between case group and control group are almost the same, like mother's age, parent's education and profession. Mother's age is a productive age and not a high risk age, so that, in general it hasn't any problem. Toddler's parent education are mostly low, this problem will add a problem in solving stunting case in Tamansari sub-district. As Soetjningsih (1995) said that parent's education is one of important factor in children's growth and development. Anisa's research (2012) showed that there was a meaningful correlation between parent's educations with stunting

case on baby in Kelurahan Kalibaru, Depok. Mostly, toddler's mothers are housewives and the fathers are laborers, those will effect on economy status and buy's ability. According to Medaniati (2014), there were some differences on food output and non-food output between families whose stunted baby with no stunted one. Food output of stunted baby family is less than non-stunted family. Research of Al Anshori and Nuryanto (2013), the research result showed that low economy status of family has risk of 11.8 times for their toddler who is stunting.

According to research of Kustanto *et al.* (2017), a gender also determines how much nutrition need of someone. Men need more energy and protein than woman. Aditianti's research (2010) said that there was a correlation between baby's gender and nutrition's status. Boys have more stunting experience than daughters. Stunting toddlers mostly found on 36-59 months age group. Some researchs showed babies over 6 months had stunting risk as research result of Lestari, *et al.* (2014) stated that infection illness was a factor of stunting risk on 6-24 months babies in Penanggalan sub- district, Subulussalam City, Aceh Province. According to Supariasa (2012), a toddler whose stunting nutrition status need to be attended. Because it showed that the baby had nutrition deficiency at the past so it hampered his optimum growth. The food that is given must be appropriate with the kind, number, and also nutrition. The nutrition that needed by children is determined by age, gender, activity, weight, and height. Children's body needs all of the main nutrition, they are, carbohydrate, fat, protein, fiber, vitamin, and mineral (Marimbi, 2010).

The lack of energy intake not only happened in the case group, but also in control group. It may be because the energy intake that got from food sources of carbohydrate, protein, and fat is less. The lack of energy intake proportion between case group (*stunting*) and control group (*non-stunting*) is almost similar. It is proved by *Chi Square* test result with score of $p > 0.05$ which shows that there is not proportion difference. OR score of 0.915 (0.51 – 1.64) can be meant by energy intake is not a risk factor of stunting case on the toddlers in Tamansari sub- district. A research of Fitri (2012) based on data of RISKESDAS 2010 in Sumatera said that nutrition intake of energy and protein showed a significant correlation on stunting case. Similar with a research of Oktarina and Sudiarti (2013) said that there was a correlation between energy consumption level and stunting case on babies.

The effect that emerged by the lack of energy intake is there is a children's growth disorder (Bread a, *et al.*). It is proved by a correlation between energy and protein sufficient level and growth disorder (Yuliana, 2014). According to Almtsier (2010) that energy intake is needed for continuity of processes in the body, such as, blood circulation, pulse rate, respiration, digestion, and other physiology processes. The lack of energy intake in long term will hamper the growth; even decrease the energy reserve in the body so it causes nutrition's deficiency and less. It effects on physical growth, having shorter body, mental development disorder, and cognitive disorder.

Based on research of Lestari *et al.*, (2014) in Penanggalan d, Subulussalam, Aceh Province, 6-24 months babies whose low energy intake level, have risk of 3.09 times to become stunting compared with babies that have sufficient energy intake level. According to a research of Kurnia, *et al.*, (2014) showed there was a correlation

between energy intake and stunting case on 24- 59 months children at Posyandu Asoka II, coast area Barombong Tamalate sub-district, Makassar.

The proportion of deficit energy intake on stunting group (62.2 %) is more than non- stunting group (37.8 %). Statistic test result shows score $p > 0.05$, it means that there is a difference of meaningful proportion between stunting group and non- stunting one. Score OR 0.44 (0,252 -0,753) can be meant as protective factor. On the baby stunting case in working area of Tamansari Medical post, baby's protein intake mostly categorized as serious deficit. Whereas, weight can be hampered if a child has protein deficiency even though the intake of protein id sufficient (Almtsier: 2010).

The lack of protein intake on stunting toddler in work area of Tamansari Medical post can be also caused by indirect factors that influence stunting like mother's caring model, food resource availability, parent's nutrition knowledge, and buy ability of toddler's family. On this research, there is also stunting baby with normal protein intake and even little upper the need. It is estimated because stunting case is going on in long term, so the present protein intake probably is not one of stunting causes. It is like what Aninditia's research (2012) that there was a positive correlation between protein sufficient level and stunting 6- 35 month's old babies in Tembalang sub-district, Semarang. The result research also explains if protein related with toddler's height, there are normal height whose protein deficiency. Protein consumption indirectly related with height, but height is a description of food intake in the past.

The research result of Kurnia *et al.*, (2014) showed that there was a meaningful correlation between stunting and macro nutrient intake (energy and protein intake). Solihinet. *al.*, (2013) showed that there was a positive significance correlation between protein sufficient level and toddler's nutrient status in DesaCibantengKabupaten Bogor. The research result stated that children with low protein intake had risk of 11.8 times for being stunting.

Zinc is one of micro minerals whose has function and the most important and essential mineral that needed by the body in synthesis, secretion, and growth hormone action. Got score $p = 0.000$ ($p < 0.05$) from statistic test result, so that it can be concluded that there is a meaningful correlation between zinc intake and stunting case on babies in work area of Tamansari Medical post. The protein intake proportion which is less than Recommended Dietary Allowances (DRA) on case group (62.5 %) is more than control group. The test result of *Chi Square* with the score $p < 0.05$ shows there is a meaningful correlation between case group and control group. Score OR shows zinc intake as protective factor of stunting case on babies.

According to research done by Priyono, *et al.*, (2015) that there was a correlation between zinc consumption and

stunting case on babies (12-36 months) in work area of RanduangMedical,PostLumajang district. This research result showed that most of toddlers with stunting nutrition status had lack of zinc consumption level those are 30 babies (65.22 %). This research is along with a research done by Mardewi (2014) about low zinc serum level as short height factor on children; there was a difference of low zinc serum level on short height children. Zink serum level on short height children is significantly lower than normal height children. Whereas, a result done by Hidayati (2010) stated that the deficiency of zinc consumption has risk 2.67 times more on stunting case on children.

In addition it can cause growth disorder (stunting) that caused by zinc deficiency, it can also cause the high number of serious infection case, such as diarrhea, pneumonia, and malaria (Almatsier, 2010). Diarrhea is related to growth fault because of mal absorption of nutrition during diarrhea. If nutrient like zinc, copper, and water during diarrhea aren't changed, it can emerge a serious dehydration, malnutrition, growth fault, even death (Meliyasari, 2014).

Infection is one of factors that directly cause nutrition's problems on babies; this is proved the toddler whose History of Infectious Disease has much percentage both in stunting group and non-stunting one. On the research result is got score $p = 0.008$ ($p > 0.05$) from statistic test result, it means that there is a meaningful correlation between History of Infectious Disease and stunting case on toddler in work area of Tamansari Medical Post. It is strengthened by the score $p < 0.05$ which means there is a difference of proportion between case group and control group. Score Odd Ratio 2.48 (1.23 – 4.90) shows that ISPA is a risk factor of stunting case on babies or children whose ISPA has risk 2.48 times more than children without ISPA. It is appropriated with research result of Lestari, et. al., (2014) stated that infection is a stunting risk factor on 6-24 months old children in Kecamatan Penanggalan, Subulussalam City, Aceh province.

A research result of Aditianti (2010), one of factors that influences significantly on stunting of 24- 59 months old children in Indonesia is infection illness. The existence of infection can make stunting worse. Toddlers who have infection will loss his appetite so they will have lack of zinc nutrition intake. Whereas, children in illness need sufficient intake of nutrition to fasten their recovery process. If it happens in long term, it can cause a disorder of their height growth. According to research of Al-Anshori (2013), ISPA history is a risk factor of stunting, because ISPA generally happens and easily spread or it can be because ISPA healing on toddler is not finished. A research of Lestari, et. al.,(2014), toddlers who get diarrhea in recent two months have risk 5.71 times to become stunting than the children who never get diarrhea in resent two months. While, the toddler who get ISPA have risk 5.71 times to become stunting than the toddler who never get ISPA in recent two months.

CONSLUSION

1. There is no correlation between energy intake with stunting case on toddlers in Tamansari Sub-district, Tasikmalaya in 2016 with score $p = 0.765$.
2. There is a correlation between protein intake with stunting case on toddlers in Tamansari Sub-district, Tasikmalaya in 2016 with score $p = 0.003$.
3. There is a correlation between Zinc intake with stunting case on toddlers in Tamansari Sub-district, Tasikmalaya in 2016 with score $p = 0.000$.
4. There is a correlation between History of Infectious Disease with stunting case on toddlers in Tamansari Sub-district, Tasikmalaya in 2016 with score $p = 0.008$.

SUGGESTION

Stunting toddler's mother should correct toddlers's eating habit, increase consumption of energy, protein and zinc nutrients and apply health and clean life attitude in toddlers's family environment, so the they avoided from infection risk.

Tamansari medical post should improve health promotion and education steps to the mothers of stunting toddler about food, nutrition, and health.

The next research for Stunting tackling in Tamansari sub-district is for followed up continued with intervension of Zinc and Protein supplement.

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