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THE RELATIONSHIP BETWEEN VEGETABLE AND ANIMAL PROTEIN INTAKE WITH THE INCIDENCE OF STUNTING IN TODDLERS IN THE STUNTING LOCUS NORTH LOMBOK REGENCY

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ABSTRACT

Stunting is a condition of growth failure due to chronic malnutrition so that growth in length or height is too short for age. According to WHO, one of the direct factors causing stunting is insufficient intake of nutrients such as protein which has a function as growth control. This study is observasional with a cross-sectional design to knowing the relationship between vegetable and animal protein intake in toddlers with the incidence of stunting in the stunting locus of North Lombok Regency.. Data were collected by filling out a 24h food recall questionnaire and looking at data related to recent PB or TB, immunization history, and access to health services in the KIA book / registration card. A total of 262 respondents meeting the inclusion and exclusion criteria participated in this study with the majority of toddlers aged 24-60 months (53.1%). The results showed PPA in stunted toddlers with less criteria as much as 51% while the ratio of vegetable protein intake was greater than animal protein by 72%. Based on the results of the chi-square test, there was a significant relationship between the ratio of vegetable and animal protein intake, $p = 0.000$ ($p < 0.05$), with the incidence of stunting. In addition, the results showed that there was a simultaneous effect on the ratio of plant and animal protein and PPA to the incidence of stunting in toddlers.

Keywords: Plant and Animal Protein Intake, Incidence of Stunting, Toddlers.

INTRODUCTION

Stunting is a condition of failure to thrive in toddlers due to chronic malnutrition so that griwth in length or height is too short for age referring to the WHO-MGRS (Multicenter Growth Reference Study)[1]. As one of the condition of malnutrition, overcoming stunting in toddlers is one of the targets in the Sustainable Development Goals (SDGs) set by the United Nations[2].

According to the standards set by WHO, an area is considered chronically malnourished if it has a prevalence of over 20% of stunting among children under five years of age[3]. Based on international data in 2020, stunting conditions in toddlers aged 0 – 59 months reached 22% where 27,4% of stunted toddlers were in the Southeast Asia region[4]. In 2019, Indonesia ranked fourth in the world and second in Southeast Asia with the number of stunting cases reaching 27,7%[5]. Based on the latest data from Studi Status Gizi Indonesia (SSGI) in 2021 by collecting data in 34 provinces and 514 district/cities, the national stunting rate is 24,4%[6]. Most of the 34 provinces showed a decrease in the prevalence of stunting compared to 2019. However, there are several provinces, including West Nusa Tenggara, where the prevalence of stunting is still high[6]. The prevalence of stunting in West Nusa Tenggara Province based on SSGI data is 31,4%[6]. The same data, especially in North Lombok Regency, found thet 34% of toddlers were stunted[6].

Stunting characterized by a z-score value of less than -2SD (stunted) dan less than -3SD (severely stunted) can begin when a toddler or since being in the womb which is the age range of the first 1000 days of life (golden age) in child growth and development that will determine the next life[1]. According to WHO (2014), the direct factors that cause stunting are infectious diseases during early life and inadequate nutrient intake, which over a long period of time can increase the incidence of growth faltering in children[7].

The need for intake of nutrients such as protein is a factor that directly affects the problem of malnutrition in toddlers because it has a major function as growth control, maintenance of body tissues and regeneration[8]. This is in line with the results of research in Padang Serai Village and Malabro Village, Fishermen Family Area, Bengkulu City by Yuliantini et al., that low protein adequacy levels in toddlers have a 4 times greater risk of stunting than adequate protein intake[9].

The average protein sufficiency level in Indonesia based on Survei Konsumsi Makanan Individu (SKMI) in 2014 reached 105,3% and the hidhest sufficiency level was in the toddler group at 134,5%[10]. However, the high percentage of adequate protein intake is not directly

proportional to the prevalence of stunting in Indonesia. This can be caused by variations in the quality of protein in the food consumed. Protein quality is determined by the composition and amount of essential amino acids (indispensable)[11].

Based on data in West Nusa Tenggara Province, the average types of food consumed by people there are cereals (302,2 gram), fish (83 gram), meat (55,5 gram), legumes (45,2 gram), and eggs (12,9 gram)[10]. Protein from animal sources, such as fish, meat, and eggs, is a complete protein content or has a high biological value because it contains all types of essential amino acids in sufficient quantities for the needs of growth and development in toddlers and has better quality because it is more easily absorbed by the body[8]. Whereas vegetable proteins, except those derived from legumes, are proteins with incomplete essential amino acid content so that they cannot meet the amount needed in the process of growth and development[8]. Based on data from the Food Scurity Agency from 2014 to 2019, the range of animal protein consumption is only 31,09% to 33,59% compared to vegetable protein consumption which reaches a range of 66,05% to 68,91%[12].

There are several studies that examine the relationship of protein intake, and furthermore the intake of vegetable protein compared to animal protein, with the incidence of stunting, including a study by Kaimilia et al., 2019 which concluded that animal protein intake is closely related to an increase in the z-score value for height-for-age so that it has the potential to reduce the incidence of stunting in toddlers[13]. Based on the above background, researchers want to conduct research on the relationship between vegetable and animal protein intake with the incidence of stunting in toddlers in the Stunting Locus of North Lombok Regency.

RESEARCH METHODS

This study is an observational analytic study with a cross-sectional research design. The research was conducted in the Stunting Locus, North Lombok Regency. The samples in this study were toddlers who were in the Stunting Locus, North Lombok Regency. In this study, the inclusion criteria included toddlers or children under 5 years of age, domiciled in the research location, and parents of toddlers willing to become research respondents by signing informed consent. In addition, there are exclusion criteria, namely being in a condition that makes it impossible to become a respondent and toddlers with a history of low birth wight.

The sampling method used is the probability sampling method, namely cluster random sampling. Cluster random sampling is done by dividing the population into subpopulations based on certain characteristics and then randomly selecting with Microsoft Excel to become research subjects. In this study, researchers used an error tolerance limit value of 10%, which means that the sample accuracy value is 90% with a minimum of 241 samples involved.

The research variables consisted of independent, dependent, and confounding variables. The independent variables in this study were vegetable and animal protein intake and PPA in toddlers while the dependent variable was stunted toddlers. In addition, the confounding variables in this study included history of infectious diseases, sanitation, basic immunization, accuracy in breastfeeding, parental education, household income, access to health care facilities, and nutrition improvement interventions.In collecting data sources, primary data in this study were obtained directly from respondents using the 24h Food Recall questionnaire method referring to the food photo book guide by Tim Survei Makanan Individu (2014) which was expressed in the form of URT (Household Size) and grams and then analyzed with the Nutrisurvey program to determine the adequacy of vegetable and animal protein intake. Other primary data were also obtained through questionnaires that included data on infection history, sanitation, accuracy in breastfeeding, parental education, household income, and the presence of interventions to improve nutritional status. Primary data collection was carried out by researchers attending the posyandu or visiting mothers of toddlers door to door with the help of cadres as a guide. Secondary data in this study were obtained from the North Lombok Regency Health Office including data on stunting toddlers from the posyandu at the research location and the results of anthropometric measurements on toddlers which include height. The measurement data will then be analyzed with the WHO Growth Chart sheet. Other secondary data obtained from maternal and child health books include a history of infant weight at birth, basic immunizations, and access to health services. Furthermore, the data will be analyzed using SPSS version 25.0. In this study, univariate analysis was conducted to determine the frequency of each variable and bivariate analysis to determine the relationship between vegetable and animal protein intake and protein adequacy with the incidence of stunting in toddlers. Both variables in this study used a categorical scale, namely nominal. Data analysis in this study used the Chi Square test. The conclusion of hypothesis testing is that there is a significant relationship if the p value <0.05 and there is no relationship if the p value>0.05.

RESULT

Characteristic of Respondents

This research was conducted by involving 15 posyandu namely Posyandu Batu Santek Bawah, Padamara, Sambik Elen, Labang Kara, Karang Gedeng, Ruak Bangket, Lendang Mamben, Srimenganti, Dasan Lendang, Telaga Legundi, Oma Segoar, Bon Segontor, Selengen, Tampes, and Dompo. Of the 15 posyandu, the number of respondents was 262 respondents.

Table 1. Characteristics of Parents of Toddlers

Characteristics	Criteria	n	%
Age of respondent (Mother)	<20 years	14	5,3
	20-40 years	233	88,9
	>40 years	15	5,7
	Total	**262**	**100**
Mother's Education	Not is school/not graduated	39	14,9
	Elementary school	69	26,3
	Junior High School	61	23,3
	Senior High School	78	29,8
	Diploma	2	0,7
	Scholar	13	5
	Total	**262**	**100**
Father's Education	Not is school/not graduated	46	17,6
	Elementary school	70	26,7
	Junior High School	51	19,5
	Senior High School	75	28,6
	Diploma	3	1,1
	Scholar	17	6,5
	Total	**262**	**100**
Household income	Less than UMP North Lombok Regency (< Rp 2.207.212)	227	86,6
	At or above the UMP of North Lombok Regency (≥ Rp 2.207.212)	35	13,4
	Total	**262**	**100**

Based on the results of the study, the majority of the age distribution of respondents was in the range of 20-40 years (88.9%), the majority of mother's and father's education was high school graduates and the prevalence of income less than the UMP set by North Lombok Regency (86.6%).

Table 2. Characteristics of Toddlers

Characteristics	Criteria	n	%
Toddler age	0 - <6 m	6	2,3
	6 - <24 m	117	44,7
	24 – 60 m	139	53,1
	Total	**262**	**100**
Gender	Male	128	48,9
	Female	134	51,1
	Total	**262**	**100**
Nutrirional Status	No *Stunting*	106	40,5
	Stunting	156	59,5
	Total	**262**	**100**

Based on the results of the study, the majority of the age distribution of toddlers is in the age range of 24-60 months (53.1%) with more female toddlers (51.1%) than male toddlers (48.9%). In addition, the majority of under-fives were stunted (59.5%).

Table 3. Distribution of Sample Characteristics

Characteritics	Category	Result	
		n	%
Comparison of Vegetable and Animal Protein Intake	Vegetable > Animal	139	53,1
	Vegetable < Animal	123	46,9
	Total	**262**	**100**
Protein Intake Adequacy Rate (PPA)	Less	126	48,1
	Sufficient	136	51,9
	Total	**262**	**100**
History of Infectious Disease	No history	213	81,3
	Occurred <3 months	49	18,7
	There is a recurrence period of at least 4 times a year	0	0,0
	Occurs <3 months and there is a recurrence period of at least 4 times a year	0	0,0
	Occurs ≥3 months without a recurrence period	0	0,0
	Total	**262**	**100**
Sanitation			
Household has a toilet for defecation purposes	Yes	216	82,4
	No	46	17,6
	Total	**262**	**100**
Type of toilet used	No	46	17,6
	Gooseneck	206	78,6
	Plengsengan with cover	1	0,4
	Plengsengan without cover	1	0,4
	Cubluk with cover	3	1,1
	Cubluk without cover	5	1,9
	Total	**262**	**100**
The habit of washing hands at 5 times using soap	Yes	108	41,2
	No	1	0,4
	Sometimes	153	58,4
	Total	**262**	**100**
Source of drinking water	Branded bottled water	3	1,1
	Refillable drinking water	8	3,1
	Tap water / PDAM	92	35,1
	Tap water bought retail	2	0,8
	Drilled well/pump	32	12,2
	Protected dug well	34	13
	Unprotected dug well	1	0,4
	Protected spring	28	10,7
	Unprotected spring	4	1,5
	Rainwater harvesting	0	0,0
	Surface water (rivers,	18	6,9

	lakes, etc.)		
	Piping / hydrants / public faucets	40	15,3
	Water terminal	0	0,0
	Total	**262**	**100**
Basic Immunization	Not getting any at all	3	1,1
	Not getting on schedule	69	26,3
	Get on schedule	190	72,5
	Total	**262**	**100**
Accuracy of Breastfeeding	**Toddler age 0 - <6 months**		
	Not given at all	0	0
	Given until <6 m old	6	100
	Given for 6 m	0	0
	Given for 6 m, continued up to 24 m with the addition of complementary foods	0	0
	Total	**6**	**100**
	Toddler age 6 - <24 months		
	Not given at all	3	2,6
	Given until <6 m old	26	22,2
	Given for 6 m	86	73,5
	Given for 6 m, continued up to 24 m with the addition of complementary foods	2	1,7
	Total	**117**	**100**
	Toddler age 24 – 60 months		
	Not given at all	4	2,9
	Given until <6 m old	11	7,9
	Given for 6 m	49	35,3
	Given for 6 m, continued up to 24 m with the addition of complementary foods	75	54
	Total	**139**	**100**
Access to Healthcare	<8 times a year	142	54,2
	≥8 times a year	120	45,8
	Total	**262**	**100**
Nutrition Improvement Interventions	Not receiving the interventions	167	63,7
	Receiving the interventions	95	36,3
	Total	**262**	**100**

Based on the results of the study, it was found that the ratio of vegetable protein intake was greater than animal protein (53.1%) and the prevalence of PPA with sufficient conditions was >100% (51.9%). In the history of infectious disease data, almost all toddlers did not have a history of infectious disease (81.3%).

In Table 3 there are several indicators to present good or bad sanitation, including data on ownership of a toilet for defecation purposes in the household, 216 respondents (82.4%) answered yes with 206 respondents (78.6%) using the gooseneck type. In the data on the habit of washing hands at 5 times using soap, 153 respondents (58.4%) chose sometimes. The last indicator is the source of drinking water where 92 respondents (35.1%) consume water from tap water / PDAM.

The results of the study related to basic immunization showed that 72.5% had received complete basic immunization according to schedule. Furthermore, data on the accuracy of breastfeeding for toddlers aged 6 - <24 months, the majority were breastfed for exactly 6 months (73.5%). In the 24-60 months age group, the majority were breastfed for exactly 6 months and then continued until 2 years old with the addition of complementary foods (54%). Data showed 142 respondents (54.2%) visited health services <8 times a year. In addition, the data showed that more under-fives in the study sites did not receive nutrition improvement interventions (63.7%).

Relationship between Respondents' Characteristics and the Incidence of Stunting

a. Respondents' Age (Mother)

Table 4. Cross Tabulation of the Relationship between Respondent's Age (Mother) and the Incidence of Stunting

Age	Stunting Status				*p- value*
	No		Yes		
	F	%	F	%	
<20 years	6	6	8	5	0,982
20-40 years	94	88	139	89	
>40 years	6	6	9	6	
Total	**106**	**100%**	**156**	**100%**	

Based on Table 4, the p-value obtained is 0.982 or> 0.05, which means that there is no significant relationship between the age of the mother and the incidence of stuntin

b. Gender of Toddlers*

Table 5. Cross Tabulation of the Relationship between Gender of Toddlers and the Incidence of Stunting

Gender	Stunting Status				*p- value*	OR (95%CI)
	No		Yes			
	F	%	F	%		
Male	41	39	87	56	0,007*	0,5
Female	65	61	69	44		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 5, the number of stunted toddlers with male gender is 87 respondents more than women, namely 69 respondents. The p-value result obtained is 0.007 or <0.05, which means that there is a significant relationship between the gender of toddlers and the incidence of stunting in toddlers.

c. Toddler Age*

Table 6. Cross Tabulation of the Relationship between Toddler Age and the Incidence of Stunting

Age	Stunting Status				*p- value*
	No		Yes		
	F	%	F	%	
0 - <6 m	1	1	5	2	0,002*
6 - <24 m	61	58	56	37	
24 – 60 m	44	41	95	61	
Total	**106**	**100%**	**156**	**100%**	

Based on Table 6, the number of toddlers who are not stunted with an age range of 24-60 months is 44 respondents less than stunted toddlers, which is 95 respondents. The p-value result obtained is 0.002 or <0.05, which means that there is a significant relationship between the age of toddlers and the incidence of stunting in toddlers.

Comparison of Vegetable and Animal Protein Intake with the Incidence of Stunting *

Table 7. Cross tabulation of the relationship between vegetable and animal protein intake and the incidence of stunting

Intake	Stunting Status				*p-value*	OR (95%CI)
	No		Yes			
	F	%	F	%		
Vegetable > Animal	26	25	113	72	0,000*	0,124
Vegetable < Animal	80	75	43	28		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 7, stunting toddlers with a ratio of vegetable protein intake is greater than animal protein intake, namely 113 respondents. The p-value result obtained is 0.000 or <0.05 which means that there is a significant relationship between the ratio of vegetable and animal protein intake with the incidence of stunting in toddlers. In addition, the OR value = 0.124 or <1 which means that there is a protective factor of 88%.

Comparative Relationship of Vegetable and Animal Protein Intake with the Incidence of Stunting Based on Toddler Age

Table 8. Cross tabulation of the relationship between vegetable and animal protein intake and the incidence of stunting based on toddler age

Age	Intake	No Stunting		Stunting		*p- value*
		F	%	F	%	
0 - <6 month	Vegetable > Animal	0	0	0	0	-
	Vegetable < Animal	1	100	5	100	
	Total	**1**	**100%**	**5**	**100%**	
6 - <24 month	Vegetable > Animal	18	30	37	66	0,000*
	Vegetable < Animal	43	70	19	34	
	Total	**61**	**100%**	**56**	**100%**	
24 – 60 month	Vegetable > Animal	8	18	76	80	0,000*
	Vegetable < Animal	36	82	19	20	
	Total	**44**	**100%**	**95**	**100%**	

Based on Table 8, the criteria for comparison of vegetable protein intake is greater than animal protein with stunting nutritional status in the age group of 24 - 60 months, namely 76 stunting toddler respondents. The p-value result obtained is 0.000 in the age range of 6 - <24 months and 24 - 60 months or a value of <0.05 which means that there is a significant relationship between the comparison of vegetable and animal protein intake based on age with the incidence of stunting, especially at the age of 6 - <24 months and 24 - 60 months .

Relationship between PPA and the incidence of stunting

Table 9. Cross Tabulation of the Relationship between AKP and the Incidence of Stunting

	Stunting Status					
PPA	**No**		**Yes**		***p- value***	**OR (95%CI)**
	F	%	F	%		
Less	47	44	79	51	0,316	0,776
Sufficient	59	56	77	49		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 9, PPA in stunted toddlers with less criteria, namely 79 respondents, is more than in non-stunted toddlers, namely 47 respondents. However, stunted toddlers with less criteria are several points more than non-stunted toddlers, namely 77 respondents. The p-value result obtained is 0.316 or >0.05 which means that there is no significant relationship between the adequacy of protein intake and the incidence of stunting.

Simultaneous Multiple Associations of Vegetable and Animal Protein Intake and PPA with the Incidence of Stunting

Table 10. The Relationship between Vegetable and Animal Protein Intake and PPA with the Incidence of Stunting Using the Simultaneous Multiple Correlation Test

	Stunting Status					
Intake	**No**		**Yes**		**R**	**Sig. F change**
	F	%	F	%		
Vegetable > Animal	26	25	113	72	0,473	0,000
Vegetable < Animal	80	75	43	28		
Total	**106**	**100%**	**156**	**100%**		
PPA	**No**		**Yes**			
	F	%	F	%		
Less	47	44	79	51		
Sufficient	59	56	77	49		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 10, the comparison of vegetable and animal protein intake and PPA with the incidence of stunting has a sig. F change 0.000 where the value is <0.05 which means there is a significant relationship and there is a simultaneous effect with an R value of 0.473 where the value is between the range of 0.41 - 0.60 which means a correlation with moderate strength between the comparison of plant and animal protein intake and PPA with the incidence of stunting.

Relationship between confounding variables and the incidence of stunting

a. History of Infectious Disease *

Table 11. Cross Tabulation of the Relationship between History of Infectious Disease and Incidence of Stunting

	Stunting Status					
History of Infectious Disease	**No**		**Yes**		***p- value***	**OR (95%CI)**
	F	%	F	%		
No history	98	92	115	74	0,000*	4,367
Occurred <3 months	8	8	41	26		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 11, the history of infectious diseases <3 months in stunted toddlers is more than that of non-stunted toddlers. The p-value result obtained is 0.000 or <0.05, which means that there is a significant relationship between the history of infectious diseases and the incidence of stunting. In addition, the OR = 4.367 or >1 is obtained which means that individuals with a history of infectious disease are at 4 times greater risk of experiencing stunting.

b. Handwashing Habit at 5 Times Using Soap*

Table 12. Cross-tabulation of the association of 5-time handwashing habits using soap with the incidence of stunting

	Stunting Status				
Handwashing Habit	**No**		**Yes**		***p- value***
	F	%	F	%	
Yes	82	77	26	17	0,000*
No	1	1	0	0	
Sometimes	23	22	130	83	
Total	**106**	**100%**	**156**	**100%**	

Based on Table 15, the majority of toddlers are stunted with the occasional option. The p-value result obtained is 0.000 or <0.05, which means that there is a significant relationship between the habit of washing hands 5 times using soap with the incidence of stunting.

Access to Healthcare*

Table 13. Cross Tabulation of the Relationship between Access to Healthcare and the Incidence of Stunting

Access	Stunting Status				*p- value*	OR (95%CI)
	No		Yes			
	F	%	F	%		
<8/year	12	11	130	83	0,000*	0,026
≥8/year	94	89	26	17		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 21, the number of toddlers with access to health services <8 times a year the majority are stunted toddlers. The p-value result obtained is 0.000 or <0.05, which means that there is a significant relationship between access to health services and the incidence of stunting.

c. Household Income *

Table 14. Cross Tabulation of the Relationship between Household Income and the Incidence of Stunting

Income	Stunting Status				*p- value*	OR (95%CI)
	No		Yes			
	F	%	F	%		
Less than UMP (< Rp 2.207.212)	78	74	149	96	0,000*	0,131
At or above the UMP (≥ Rp 2.207.212)	28	26	7	4		
Total	**106**	**100%**	**156**	**100%**		

Based on Table 22, the majority of lower household income is in stunted toddlers. The p-value result is 0.000 or <0.05, which means that there is a significant relationship between household income and the incidence of stunting.

d. Nutrition Improvement Interventions *

Table 15. Cross Tabulation of the Relationship between Nutrition Improvement Interventions and the Incidence of Stunting

Interventions	Stunting Status				*p- value*
	No		Yes		
	F	%	F	%	
Not receiving the interventions	25	24	142	91	0,000*
Receiving the interventions	81	76	14	9	
Total	**106**	**100%**	**156**	**100%**	

Based on Table 23, the majority of stunted toddlers did not receive nutritional improvement interventions. The p-value result is 0.000 or <0.05, which means that there is a significant relationship between nutritional improvement interventions and the incidence of stunting.

DISCUSSION

The purpose of the study was to determine the relationship between vegetable and animal protein intake and the incidence of stunting in the Stunting Locus, North Lombok Regency. Based on these objectives, there are two main variables studied, namely the comparison of vegetable and animal protein intake and PPA. PPA in stunted toddlers with less criteria is not significantly different from the sufficient criteria. Based on statistical analysis, there was no significant relationship between PPA and the incidence of stunting (p = 0.316).

This is in line with research by Suryana (2018) which states that there is no significant relationship between PPA and the incidence of stunting in toddlers (p = 0.274). This can be due to the possibility of other factors such as a history of infectious diseases that result in disturbances in protein metabolism. This metabolic disorder is seen from an increase in protein breakdown for body defense so that protein for the growth process is reduced[14]. In addition, PPA that is not associated with the incidence of stunting can be caused by the limited duration of filling out the food recall, so that individual consumption patterns are not visible. However, in a study by Fikawati et al. (2021) stated that toddlers with low PPA (<80%) had a 4x greater risk of

stunting compared to adequate PPA (p = 0.04). Inadequate protein intake based on quality and quantity will affect the production and work of the hormone Insulin Growth Factor (IGF-I)[16]. IGF-I hormone is stimulated by growth hormone (GH) in promoting growth by increasing protein synthesis and cell division[17]. In addition, IGF-I plays a role in influencing bone growth by stimulating chondrocyte proliferation and differentiation at the epiphyseal plate, as well as increased calcium and phosphorus absorption by the conversion of 25 hydroxy-vitamin D3 to 1,25 dihydroxy-vitamin D3 [17,18].

PPA in toddlers is related to variations in the quality of protein in the food consumed; the quality of protein is determined by the amount of essential amino acids[11]. Toddlers in North Lombok Regency consume the majority of vegetable protein compared to animal protein. Based on statistical analysis, there is a significant relationship between vegetable and animal protein intake and the incidence of stunting (p = 0.000).

This is in line with research in Penawangan Village, Semarang Regency, which states that toddlers with animal protein intake in the severe deficit category are associated with stunting (p = 0.0001)[19]. This is because animal protein has a more complete amino acid content, one of which is methionine; Methionine levels have an impact on the growth rate in synthesizing cartilage for further ossification[19]. In addition, research by Setiana also states a positive correlation relationship where the higher the intake of vegetable protein, the more linearly it will affect the increase in z-score; however, it needs to be combined with animal protein or other complementary foods so that the amino acids obtained are more complete in helping the growth and development process of toddlers[19]. However, according to research in agricultural areas by Alim et al., concluded that the level of adequacy of vegetable and animal protein intake in the stunting group (161.01%) was better when compared to the non-stunting group (144.53%) (p = 1.00)[20].

The comparison of vegetable and animal protein intake that is not associated with the incidence of stunting can be caused by the factor of filling out the 24h food recall questionnaire which is very dependent on the respondent's memory. In addition, data collection using 24h food recall causes the flat slope syndrome. This is a situation where respondents with stunted toddlers have a tendency to mention more consumption (over estimate).

In addition to the PPA variable and the ratio of vegetable and animal protein intake, there are several variables that show a significant association with the incidence of stunting in the Stunting Locus of North Lombok Regency, namely the history of infectious diseases, the habit of washing hands 5 times using soap, access to health services, household income, and nutrition improvement interventions.

CONCLUSIONS

Based on the research that has been conducted, it can be concluded that:

1. There is a significant association as well as a simultaneous effect between the ratio of vegetable and animal protein intake and PPA with the incidence of stunting in children under five years of age with moderate strength
2. There is a significant association between the history of infectious diseases, 5-time hand washing habits using soap, access to healthcare, household income and the provision of nutritional improvement interventions with the incidence of stunting in toddler
3. There were 72% of stunted toddlers with intake of vegetable protein > animal protein in the study location
4. There were 59.5% of stunted toddlers in the research location, namely in the Stunting Locus, North Lombok Regency

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