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Journal of Global Nutrition (JGN)
Volume 4 No 2 (2024) November: page 366-373
ISSN: 2776-7051
Published by *Ikatan Sarjana Gizi Indonesia (ISAGI)* – The Indonesian Nutrition Scholars Association

Original Research

The Relationship Between Protein and Iodine Intake and The Incidence of Stunting in Toddlers Aged 12-24 Months at The Srumbung Health Center, Magelang Regency

Hubungan Antara Asupan Protein Dan Yodium Dengan Kejadian Stunting Pada Anak Balita Berusia 12-24 Bulan Di Puskesmas Srumbung Kabupaten Magelang

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Abstract: *Stunting is a condition of growth failure in toddlers due to chronic malnutrition, especially in the first 1000 days of life, namely from when the child is in the womb until the age of 24 months. Toddlers are said to be stunted if their height per age is <-2 SD. The purpose of this study was to determine the relationship between protein intake and iodine intake with the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center, Magelang. This study used a cross-sectional research design with a sample size of 100 toddlers aged 12-24 months at the Srumbung Health Center. Based on the results of the study, it was stated that the better the daily protein intake of toddlers in the last 3 months, the lower the risk of toddlers aged 12-24 months at the Srumbung Health Center experiencing stunting. From this study, it can be concluded that the incidence of stunting in toddlers aged 12-24 months in the Srumbung Health Center area is related to protein intake but not to iodine intake.*

Key word: Stunting, Protein Intake, Iodine Intake, Srumbung

1. INTRODUCTION

Stunting is a condition of growth failure in toddlers due to chronic malnutrition, especially in the first 1000 days of life, namely from when the child is in the womb until the age of 24 months (1). A child is said to be stunted if his/her height per age is between the Z-score <-2 SD from the WHO standard (1). The direct cause of stunting is food intake. Lack of nutritional intake for a long time can interfere with the growth and development of children (2). Food intake plays an important role in preventing stunting, including energy, protein, carbohydrates, iodine, vitamin A, zinc, iron, calcium and phosphorus (3).

Protein intake plays a role in toddler growth. Protein is related to the effect on the bone matrix, and growth factors, as well as calcium and phosphorus which play an important role in bone formation (4). Growth in toddlers requires a greater protein intake than adults whose growth has stopped (5). According to research, there is a relationship between protein intake and stunting in toddlers aged 24-59 months. Low protein intake affects growth, formation of structural components and antibody formation, if protein intake is lacking, there is a risk of stunting (6). Iodine plays a role in the biosynthesis of thyroid hormones for growth, development, and metabolic processes

(7). Thyroid hormones also affect epiphyseal growth, bone maturation and height (body length) by controlling the speed of cells to release nutrients to produce energy (8). According to research there is a significant relationship between iodine intake and the incidence of stunting. Mothers who have toddlers with insufficient iodine intake are 6.297 times more likely to have children who experience stunting compared to mothers who have toddlers with sufficient iodine intake (9)

Areas with many mountains are often considered poor in iodine and at risk of iodine deficiency disorders (IDD) (10). Magelang Regency is endemic to IDD and stunting in Central Java Province with a low level of iodized food consumption of 71.24% (11) with a stunting prevalence of 25.8%. This prevalence is higher than the prevalence of Central Java province, which is 20.7%. One of the areas in Central Java with a mountainous area is Srumbung District, Magelang Regency. This study aims to examine the relationship between protein intake and iodine intake with the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center, Magelang.

2. METHODS

This study used a cross-sectional research design with dependent variables of stunting incidence, independent variables of protein and iodine intake, confounding variables of parental income, maternal education and history of infectious diseases. The number of samples was 100 toddlers aged 12-24 months, at the Srumbung Health Center, Magelang Regency. The study period started from December 2023 to January 2024. Data collection through interviews and measuring toddler height using a microtoise, filling out a semi-quantitative FFQ, and using a semi-structured questionnaire. Data analysis used SPSS software.

3. RESULTS

Table 1 shows that mothers of toddlers aged 12-24 months at the Srumbung Health Center with low education are at risk of having stunted toddlers 3.6 times higher than mothers of toddlers aged 12-24 months at the Srumbung Health Center with high education (3.6; 0.03; 1.05-12.9). This shows that the higher the education of the mother of the toddler, the lower the risk of toddlers aged 12-24 months at the Srumbung Health Center experiencing stunting. Parental income did not show a statistically significant relationship with the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center (2.2; 0.31; 0.4-10.7). A history of infectious diseases in the last 3 months did not show a statistically significant relationship with the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center (P <0.05).

Table 1 Relationship between Toddler Infection History, Mother's Education, and Parental Income in Toddlers Aged 12-24 Months with Stunting Incidents at Srumbung Health Center

Variables	Nutrition status				PR	*p* value	95%CI
	Stunting		Normal				
	n	%	n	%			
Mother's Education level							
Low Elementary and Junior High School	9	21,4	33	78,6	3,6	0,03*	1,05-12,9

The Relationship Between Protein and Iodine Intake and The Incidence Of Stunting In Toddlers Aged 12-24 Months At The Srumbung Health Center, Magelang Regency

Variables	Nutrition status				PR	*p* value	95%CI
	Stunting		Normal				
	n	%	n	%			
High Senior High School and College	4	6,9	54	93,1			
Monthly Family Income							
Low income (< Rp. 2,236,776)	11	15,1	62	84,9	2,2	0,31	0,4-10,7
Standard (≥ Rp. 2,236,776)	2	7,4	25	9,.6			
History of Diarrhea in the Last 3 Months							
Yes	0	0	6	100	0,8	0,30	0,79-0,9
No	13	13,8	81	86,2			
History of dyspnea in the last 3 months							
Yes	1	7,7	12	92,3	1,9	0,50	0,2-16.1
No	12	13,8	75	86,2			
History of Cough and Cold in the Last 3 Months							
Yes	4	8,9	41	91,1	2,0	0,20	0,5-7,0
No	9	16,4	46	83,6			

Table 2 shows that toddlers aged 12-24 months at the Srumbung Health Center with low protein intake (<20 grams/day) have a 4.8 times higher risk of experiencing stunting compared to toddlers aged 12-24 months at the Srumbung Health Center with good protein intake (≥20 grams/day), (0.01;1.31-17.6). This shows that the better the daily protein intake of toddlers in the last 3 months, the lower the risk of toddlers aged 12-24 months at the Srumbung Health Center to experience stunting. Iodine intake did not show a statistically significant relationship with stunting in toddlers aged 12-24 months at the Srumbung Health Center (2.92;0.51-17.2;0.20).

Table 2 Relationship between Protein Intake and Iodine Intake with the Incidence of Stunting in Toddlers Aged 12-24 Months at the Srumbung Health Center

Variables	Nutrition status				PR	*p* value	95%CI
	Stunting		Normal				
	n	%	n	%			
Daily Protein Intake							
Low (<20 gram/day)	5	33,3	10	66,7	4,81	0,01*	1,31-17,6
Good (≥20 gram/day)	8	9,4	77	90,6			
Daily Iodine Intake							
Low (<90 mcg/day)	2	28,6	5	71,4	2,92	0,20	0,51-17,2
Good (≥90 mcg/day)	11	11,8	82	88,2			

4. DISCUSSION

The results of the study showed that the risk of experiencing stunting in toddlers aged 12-24 months was positively correlated with the higher level of education of the toddler's mother. According to this study, there is a relationship between maternal education and cases of stunting in toddlers in the stunting locus village at the Paron Health Center, Ngawi Regency in 2022 (12). In addition, this study found that there was

a relationship between maternal education and stunting rates at the Cilacap Tengah II Health Center (13). Research found that there was a significant relationship between maternal education and stunting rates in toddlers aged 6-59 months in Mataram Ilir Village, Seputih District, Surabaya, Central Lampung (14).

Mothers play an important role in regulating parenting patterns and providing good nutrition to their children and toddlers. Highly educated mothers have extensive knowledge, especially about the importance of nutrition for children (15). Mothers' attitudes and behaviors about meeting children's nutritional needs, which are related to their family's eating habits. Higher education makes mothers more likely to choose healthy foods and foods with high nutritional content for their children to consume, so that nutritional adequacy can be met (12). Maternal education also affects child care patterns, because mothers are the controllers of food in the family and play a major role in improving the family's nutritional status (16).

The mother's ability and knowledge about health care, especially nutritional knowledge, will be indirectly influenced by the mother's level of education (14). The mother's level of education also determines how easy it is for mothers to take and understand the nutritional knowledge they gain. To maintain family health, education is needed so that mothers are more aware of family nutritional problems (17). Mothers with low education find it difficult to accept new things, which is a major obstacle to improving their family's health. Mothers with low education also find it difficult to understand the importance of nutritional knowledge for their families (18). The community at the Srumbung Health Center can further improve education for mothers before pregnancy until the birth of their child, so that mothers can prepare their roles so that toddlers can avoid stunting.

The results of the study that have been conducted show that toddlers aged 12-24 months with sufficient protein intake (<20 grams/day) have a higher risk of stunting compared to toddlers aged 12-24 with good protein intake (≥20 grams/day). This study is in line with research that there is a relationship between protein intake and the incidence of stunting (6). Protein is very important for the growth of toddlers. Insufficient protein intake can cause long-term energy loss. If this continues for a long time, it can interfere with linear growth (6). This study is also in line with previous studies which state that improving the nutritional status of toddlers is done by increasing animal protein intake. This will reduce the risk of stunting. Lower protein consumption can increase the risk of stunting (18). In addition, this study is also in line with research that the lower the protein consumption, the greater the risk of stunting (19).

According to Farahiyah, protein can affect bone growth by stimulating the proliferation and differentiation of chondrocytes in the epiphyseal growth plate. In addition, protein can also affect osteoblasts (20). Protein is very important for the growth and development of toddlers and for maintaining body tissue in adulthood because its main function is to form new tissue and repair damaged tissue. The process of regeneration and repair of body tissue will be disrupted if protein consumption is reduced (21).

The body cannot process protein quickly so further protein production is needed (6). The most important nutrient found in food is protein which is used to build body cells needed during the growth and development of toddlers (22). If protein intake is lacking, the production of Insulin-Like Growth factor 1 (IGF-1) will be disrupted so that bone mineral mass and bone growth are disrupted (3). Toddlers can experience decreased

growth and development because the quality of the protein they consume is low (23). The quantity and quality of protein consumed affect the growth hormone mediator, namely plasma levels of Insulin-Like Growth Factor I (IGF-I) (24). The recommended consumption of quality protein intake is around 25% of the protein adequacy rate (25). Therefore, toddlers aged 12-24 months at the Srumbung Health Center are expected to consume foods containing protein in order to prevent stunting.

The results of the study showed that there was no relationship between iodine intake and stunting in toddlers aged 12 to 24 months at the Srumbung Health Center. This finding is in line with the theory that there is no relationship between iodine intake and stunting (26). This study is also in line with Rusdi's study, which found no significant relationship between iodine consumption and the incidence of stunting in toddlers (27). In addition, this study is also in line with Andini's study, which found no significant correlation between consumption of foods containing iodine in the family and stunting in toddlers (10).

Iodine is one of the essential nutrients found in small amounts in the body. Iodine is a component of the thyroxine hormone that controls the growth and development of toddlers (28). Children under 5 years of age are very susceptible to iodine deficiency. Thyroid hormone deficiency can reduce the activity of growth hormones such as insulin-like growth hormone which results in a number of other developmental and functional disorders (10). During the growth and development process, T3 hormone is needed and if iodine deficiency occurs during this process, the basal metabolic rate becomes slow so that the growth and development process is hampered. One of the minerals that make up thyroid hormones (T3 and T4) is iodine (7). Thyroid hormones control how much oxygen each cell uses and how much energy is released from energy-producing nutrients. Thyroxine has the ability to increase protein and carbohydrate metabolism by up to thirty percent (7). Iodine intake can change and differ in each individual. Researchers assume from this situation that iodine consumption affects child growth and nutritional status, but is not one of the factors that causes stunting. Therefore, although there is no relationship between iodine intake and the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center, it is recommended to consume foods containing iodine so that iodine needs are met so that in the future toddlers can grow and develop well without nutritional problems.

5. CONCLUSION

It can be concluded that there is a relationship between maternal education and the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center. There is a relationship between protein intake and the incidence of stunting in toddlers aged 12-24 months at the Srumbung Health Center. The better the daily protein intake of toddlers in the last 3 months, the lower the risk of toddlers aged 12-24 months in the Srumbung Health Center work area to experience stunting.

ACKNOWLEDGEMENT

The authors declare that there were no conflicts of interest in this study.

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