

Association of Nutritional Intake and Toddler Development

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ABSTRACT

Introduction: This study explores the impact of nutritional intake on the growth and development of children, particularly in terms of brain development during the toddler phase. The objective was to establish a link between nutritional intake and children's development.

Methods: This research employs a quantitative approach, utilizing an analytical survey design with a cross-sectional methodology. The research tools consisted of a developmental pre-screening questionnaire and a Food Frequency Questionnaire (FFQ). The sample included 74 children aged 1 to 3 years, who were attendees of the Bulukunyi Health Center in Takalar Regency. The data analysis was conducted using the Chi Square test, with statistical significance set at $p < 0.05$.

Results: The study unveiled noteworthy correlations between protein intake ($p = 0.013$), vitamin A ($p = 0.019$), and vitamin C ($p = 0.011$) and the growth and development of children.

Conclusion: This research establishes a positive connection between protein intake, as well as the intake of vitamin C and vitamin A, and the development of children during the toddler phase.

Keywords: Nutrition intake; child development; toddler



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Introduction

The quality of the nation's next generation depends on the quality of children's growth and development, especially at the age of toddler (1 - 3) years, when children's brains are in very significant development. Families must make maximum efforts so that their children's growth and development occur optimally; this is to avoid abnormal, doubtful or deviant growth and development. Abnormal growth and development must be detected (found) early, especially before children are 3 years old so that intervention efforts can be made (repaired) immediately. If it is detected too late, it will be too late to take action, making it difficult to correct the abnormality. Childhood is considered as a very important phase of life because it will determine the quality of one's health, well-being, learning ability and behavior in the future; and the future of society depends on the ability of children to achieve optimal growth and development.⁽²⁾

According to data millions of children who always get problems in the developmental period. WHO data for 2021 shows that the number of stunting cases in the world has reached 22% or as many as 149.2 million cases in 2020.⁽³⁾⁽⁴⁾ In 2020 UNICEF stated that stunting reflects chronic malnutrition and can have long-term impacts, one of which is a decrease in the development of cognitive and mental abilities.⁽⁵⁾ The results of a study related to Indonesia's nutritional status in 2022 show that South Sulawesi Province is included in the list of the top 10 provinces with the highest number of stunted toddlers with a total percentage of 27.2%⁽⁶⁾ and the number of toddlers with malnutrition reaches more than 41,000 children.⁽⁷⁾

Based on the problems above, this study aims to see the correlation between nutritional intake and the development of children at the age of toddlers.

Methods

This is a cross-sectional study that evaluated nutritional intake and toddler growth and development. The variables that were researched in this study were nutritional intake and children's growth and development. This research was conducted at the Bulukunyi Health Center, Takalar Regency, in January 2021. The population who became the object of this study were toddlers at the Bulukunyi Health Center. The samples in this study were toddlers using the purposive sampling research method, where samples were taken according to participants who had inclusion and exclusion criteria. Inclusion criteria: ⁽¹⁾ toddlers with mothers who are willing to fill out the questionnaire, ⁽²⁾ children aged 1-3 years who live in the study area, and ⁽³⁾ children who were healthy at the time of the study; while on the other hand the exclusion criteria are toddlers who suffer from congenital defects and mothers of children who have a mental disorder and unable to communicate. The number of case samples that fit the inclusion and exclusion criteria was 74 people. Primary data for this research comprised toddler nutritional intake information, which participants provided by completing the food frequency questionnaire (FFQ) obtained from the Ministry of Health and also used

by Nurmalita Sari (2015) in her research. Children's developmental data, on the other hand, was sourced from the KPSP. Following data collection, the information was subjected to processing using the SPSS software. Initially, univariate analysis was applied to establish the frequency distribution of the variables under examination. Subsequently, a bivariate analysis was performed utilizing the Pearson Chi-square test to ascertain the potential correlation between nutritional intake and children's development.

Result

Univariate analysis

Table 1

Characteristics of respondents in Bulukunyi Health Center

Respondent Characteristic	N	%
Age of Toddler		
1-2 year	23	31,1
2-3 year	51	68,9
Work		
Government employees/Army/Policy	-	-
Trader	2	2,7
Farmer	13	17,5
Housewife	59	79,7
Education		
No school	3	4,05
Elementary school	20	27,02
Junior High School	10	13,5
Senior High School	36	48,6
University	5	6,75
Total	74	100

Primary Data, 2021

Based on Table 1 above, it can be seen that the majority of respondents have children aged 2-3 years, namely as many as 51 people (68.9%), respondents with housewife jobs are 59 people (79.7%) and respondents with high school education are 36 people (48.6%).

Age of Child

In this study, the distribution of children was carried out based on age grouping categories which can be seen in table 1. The results showed that 31.1% of children were aged 1-2 years and 68.9% of children aged between 2-3 years.

Table 2

Distribution of case samples by age group (n = 74)

Age	Amount	Percentage (%)
1-2 Years	23	31.1

>2-3 Years	51	68.9
Total	74	100

Primary Data, 2021

Protein Nutrition Intake

Sample distribution based on protein nutritional intake can be seen in table 2. The results in this study showed that the consumption of protein nutrition by toddlers who are in the less category was 2.7%, in the good category was 24.3%, and in the over category was 73%.

Table 3

Distribution of case samples based on consumption of protein nutrient intake (n = 74)

Protein	Amount	Percentage (%)
Less	2	2.7
Good	18	24.3
Over	54	73
Total	74	100

Primary Data, 2021

Vitamin C Nutritional Intake

Sample distribution based on nutritional intake of vitamin C can be seen in table 3. The results in this study showed that the consumption of vitamin C nutritional intake was in the less category, amounting to 44.6%; in the good category, amounting to 0%; and in the over category, amounting to 55.4%

Table 4

Distribution of case samples based on consumption of vitamin c nutritional intake (n = 74)

Vitamin C	Amount	Percentage (%)
Less	33	44.6
Good	0	0
Over	41	55.4
Total	74	100

Primary Data, 2021

Vitamin A Nutritional Intake

Sample distribution based on nutritional intake of vitamin A can be seen in table 4. The results of this study showed that the consumption of vitamin A in the less category was 48.6%, in the good category was 0%, and in the more category was 51.4%.

Table 5

Distribution of case-based samples consumption of vitamin a nutritional intake (n=74)

Vitamin A	Amount	Percentage (%)
Less	36	48.6
Good	0	0
Over	38	51.4
Total	74	100

Primary Data, 2021

Children's development

Sample distribution based on children's development can be seen in table 5. The results of this study showed that the development of children in the abnormal category was 16.2%, in the doubtful category was 6.8% and in the Normal category was 77%.

Table 6

Distribution of case samples based on child development (n=74)

Child development	Amount	Percentage (%)
Abnormal	12	16.2
Doubtful	5	6.8
Normal	57	77.0
Total	74	100

Primary Data, 2021

Bivariate Analysis

Correlation between Protein Nutrition Intake and Child Development.

The correlation between protein nutritional intake and children's development can be seen in table 6.

Table 7

Correlation of protein nutrition intake with child development

		KPSP								<i>P – value</i>
		Abnormal		Doubtful		Normal		Total		
		N	%	N	%	N	%	N	%	
Protein	Less	7	38,9	0	0	11	61,1	18	100	0,013
	Good	1	50	0	0	1	50	2	100	
	Over	4	7,4	5	9,3	45	83,3	54	100	
Total		12	16,2	5	6,8	57	77	74	100	

The findings demonstrated a link between protein consumption among young children and their KPSP scores. The Chi square statistical analysis yielded a p-value of 0.0131, surpassing the alpha value of 0.05. Therefore, it can be deduced that a notable and favorable association exists between protein intake and child development.

Correlation between Vitamin A Intake and Child Development.

The Association between vitamin A consumption and the development of children can be seen in table 7.

Table 8

Correlation of vitaminA intake with child development

		KPSP								<i>P – Value</i>
		Abnormal		Doubtful		Normal		Total		
		N	%	N	%	N	%	N	%	
Vitamin A	Less	10	27,8	1	2,8	25	69,4	36	100	0,019
	Good	-	-	-	-	-	-	-	-	
	Over	2	5,3	4	10,5	32	84,2	38	100	
Total		12	16,2	5	6,8	57	77	74	100	

The analysis outcomes concerning the connection between vitamin A consumption in young children and KPSP indicated that the Chi square statistical test produced a p-value of 0.019, exceeding the alpha threshold of 0.05. Consequently, it can be inferred that a notable correlation exists between vitamin A intake and children's development (KPSP).

Correlation between Vitamin C Intake and Child Development

The correlation between vitamin C intake and child development can be seen in table 8.

Table 9

Correlation between vitamin C intake with child development

		KPSP								<i>P - value</i>
		Abnormal		Doubtful		Normal		Tota I		
		N	%	N	%	N	%	N	%	
Vitamin C	Less	9	27,3	4	12,1	20	60,6	33	100	0,011
	Good	-	-	-	-	-	-	-	-	
	Over	3	7,3	1	2,4	37	90,2	41	100	
Total		12	16,2	5	6,8	57	77	74	100	

The analysis outcomes about the relationship between vitamin C consumption in young children and KPSP demonstrated that the Chi-Square statistical test yielded a p-value of 0.011, which falls below the alpha threshold of 0.05. Hence, it can be deduced that a significant correlation exists between vitamin C intake and children's development.

Discussion

Relationship between protein intake and child development

Based on this research, it can be seen that most children are at the toddler have more protein intake which is equal to 73%. Obtained more protein in older children toddler because the habit of the majority of children in this study liked to eat Moringa leaf vegetables. Based on this study, the majority of mothers in the Bulukunyi Health Center work area often make their children moringa leaf vegetables, this is in line with research that the nutritional content of 2-10 moringa leaf stalks contains 28.25% protein. ⁽⁸⁾

The research results are relation to protein intake with developments old age toddler with the results of the test analysis who squares- P-value 0.013. This research is appropriate with Nurul's research (2018) there is a relationship between energy intake and protein intake with gross motor development with each *pvalue* 0.022 and 0.001. ⁽⁴⁾⁽⁹⁾

Protein is composed of amino acids, namely essential and non-essential. The amino acid tyrosine is a type of amino acid related to the mechanism of motor movement where tyrosine is a constituent of the neurotransmitter dopamine which plays a role in transmitting impulses from one nerve to another. ⁽⁴⁾⁽¹⁰⁾

Other research that supports the relationship between protein intake and child development is research from (Setiawan, 2017) ⁽¹¹⁾ which states that a lack of protein intake affects cognitive abilities, cognitive abilities are brain activities that occur in order to gain knowledge or information. The process of cognitive ability is the occurrence of very active communication between brain cells. Communication between one brain cell and another brain cell occurs through the delivery of messages by a neurotransmitter. The neurotransmitter is a chemical compound consisting of amino acids, namely protein building monomers (amino acid polymers). Hundreds of neurotransmitters are produced in the brain. The production of neurotransmitters requires protein which must be obtained from food intake. ⁽¹²⁾⁽¹³⁾

Relationship between vitamin A intake and child development

Based on the research, it can be seen that most children at toddler age have more vitamin A intake, which is equal to 51.4%. *Chi-Square P-Value* 0.019. Obtained more vitamin A in children aged toddlers because the majority of children there like to eat kelor leaf vegetables. Based on this research, the majority of mothers in the working area of the Bulukunyi Health Center often make their children Moringa leaf vegetables and the nutritional content of Moringa leaves for every 2 grams of Moringa leaves contains 600 IU of vitamin A.

This study aligns with the findings of (Hapzah 2016), indicating a connection between vitamin A and nutritional status. This is due to the involvement of vitamin A in protein synthesis, upkeep of typical epithelial structure, and the growth of bones.⁽¹³⁾⁽¹⁴⁾

Relationship between vitamin C intake and child development

Based on research, it can be seen that most children at toddler age have more vitamin C intake, namely 55.4%. The results of this study found that there was a relationship between vitamin C intake and the development of toddler aged children with the results of the test analysis *Chi-Square P-value* 0.011. Obtained more vitamin C in older children toddler because the majority of children there like to eat Moringa leaf vegetables. Based on this research, the majority of mothers in the working area of the Bulukunyi Health Center often make their children Moringa leaf vegetables, for the nutritional content of Moringa leaves, every 2 grams of Moringa leaves contain 11 milligrams of vitamin C.⁽¹³⁾⁽¹⁵⁾

Conclusion

Based on result of research about intake relationship nutrition for development old age *toddler* in the Bulukunyi Health Center, Takalar Regency, it can be concluded that intake protein, vitamin A, and vitamin C has a significant relationship with child development.

Conflicts of Interest

There is no conflict of interest

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