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A Review of the Relationship between Preschoolers' Energy and Protein Consumption and their Nutritional Status in the Early Childhood Education Setting (Age < 5 Years)

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ABSTRACT

Adequate nutrition is also very influential on human productivity. A pre-school age child is experiencing a period of relatively rapid growth and development. The purpose of this study was to determine the analysis of energy and protein consumption on nutritional status in pre-school children (age < 5 years). The research design is a correlational study with a cross sectional design approach. The independent variable is energy and protein consumption, while the dependent variable is nutritional status. The population is all pre-school age children (age < 5 years) as many as 24 respondents. The data collection technique used a questionnaire. The results showed that most of the respondents had the appropriate energy consumption as many as 18 respondents (75.0%), most of the respondents had the appropriate protein consumption as many as 18 respondents (75.0%) and most of the respondents had normal nutritional status, namely as many as 17 respondents (70.8%). Data analysis using linear regression test to determine the effect of energy and protein consumption on nutritional status in pre-school age children (age < 5 years) obtained sig (2-tailed) or p-value = 0.000 and error level or = 0.05, so p < , 0.006 < 0.05 so H1 is accepted, meaning that energy and protein consumption on nutritional status in pre-school age children (age < 5 years). The conclusion of this study is that nutrition is a manifestation of energy intake and expenditure.

Keywords: Energy, Nutritional Status, Protein Consumption

BACKGROUND

Adequate nutrition and food is one of the most important factors in developing the quality of human resources and a key factor in the development of a nation. Adequate nutrition also greatly influences human productivity. A preschool child is experiencing a relatively rapid growth and development period (Almaitser, 2002 in Putri, 2019). One of the direct factors that affects the nutritional status of preschool children is food intake. A healthy and normal child will grow according to their genetic potential with sufficient food intake (Khomsan, 2018). Malnutrition is more caused by an imbalance in energy consumption, because the energy expended is less than the energy input. The change in eating patterns from a traditional diet that is high in carbohydrates, high in fiber and low in fat to a new diet that is low in carbohydrates, low in fiber and high in fat also supports the occurrence of overnutrition (Putri, 2019).

Based on Riskesdas 2020, the eating patterns of children aged 4-6 years are still largely below the AKG and a 2019 survey, based on toddler weighing (BB/TB) at all integrated health posts, found cases of malnutrition of 26,518 toddlers nationally (Riskesdas, 2020; Ministry of Health, 2020). According to the East Java Health Office, in 2020 the prevalence

of underweight was 19.1% of the total number of toddlers (East Java Health Office, 2020). Cases of malnutrition in toddlers are still high. The number of toddlers whose health conditions were very thin and thin reached 5,221 toddlers or 3.12% of the total 167,062 toddlers in Kediri City. Meanwhile, the incidence of obese nutritional status was around 3.61% or 6,032 toddlers.

Based on the results of a preliminary study it showed that the average frequency of children's meals in one day was two to three times with a simple menu in one meal. On average, children's menus, white rice is the daily staple food and the main side dishes available every day are tofu, tempeh, fish. Vegetables and fruits are not consumed every day or at every meal. The results of measuring nutritional status based on height/age of 10 children, there were 4 children who experienced stunting, from the 4 children it was known that in everyday life children like to eat dry foods (for example: rice + Kentucky + chili sauce, rice with fish only, rice with tempeh only and rice with tofu only) without vegetables, parents said that children do not like to eat vegetables and if vegetables are made children refuse to eat.

According to Gerorgieff (2001) dalam Ameilia (2017) energy plays a role in influencing substances chemicals in the brain that are often called neurotransmitters. Protein in the amino acid tyrosine is related to neurotransmitters and serotonin plays a role in stimulating sleep which is important for brain development in processing information while catecholamine is related to the state of alertness that helps absorb information in the brain. Iron (Fe) plays a role in monoamine synthesis, energy metabolism in neurons and myelination and zinc (Zn) plays a role in the release of neurotransmitters. One of the causes of improper nutritional intake is wrong behavior in providing food for toddlers which includes the amount of food given is not appropriate, the type of food is not diverse and the frequency of feeding in a day. Child growth is influenced by the quality of food consumed, while the quality of food depends on the pattern of feeding (Krisnana, 2019). The role of the mother in this case is very necessary, where many mothers complain that their children have difficulty eating and are very picky. Often mothers give their children only one side dish, such as tofu and rice, or tempeh and rice. This can cause children not to get a balanced nutritional intake. In addition, children's bad habits when eating, such as not finishing their meals, not eating on time, nutritional imbalance on one plate, children's habits of preferring to consume snacks rather than healthy foods, children's lack of interest in food and only wanting to consume snacks (Rahmania, 2022).

One of the efforts made by the government to achieve welfare and reduce child mortality in 2030 is to sign the Sustainable Development Goals (SDG's) declaration. The target for 2030 is to end hunger and ensure access to safe, nutritious, and sufficient food for all people, especially the poor and vulnerable including infants, throughout the year. The second is in 2030, ending all forms of malnutrition, including achieving the 2025 international target for reducing stunting and wasting in toddlers and addressing the nutritional needs of adolescent girls, pregnant and lactating women, and the elderly (Ministry of Health of the Republic of Indonesia, 2020). Health workers play a very important role in improving the quality of health services in order to reduce MMR and IMR, as well as increasing public awareness to behave healthily both in terms of providing health education and counseling to individuals, families, groups, and communities (Saleha, 2019). The counseling provided will teach about nutrition is an effort aimed at overcoming nutritional problems by providing nutritional messages to optimize nutritional consumption through behavioral changes in the selection and provision of daily food (Munawaroh & Muftiana, 2013). Counseling that can be given to the community to improve children's nutrition includes: 1) teaching parents about a healthy and balanced menu; 2) teaching parents about how to provide good food for children, 3) teaching parents about how to prepare food for children, 4) teaching parents about how to

make a food diary and how to use it for children's meal planning (Ministry of Health of the Republic of Indonesia, 2019).
Seeing the importance of the above problem, the researcher is interested in conducting research on: "Analysis of Energy and Protein Consumption on Nutritional Status in Pre-School Children (Age < 5 Years).

METHODS

Research design is the entire planning to answer research questions and anticipate any difficulties that may arise during the research process (Nursalam, 2019).
Research Design is a description of the entire researcher's activities during research work, from preparation to implementation of the research (Nursalam, 2019). The research design used in the study is correlation research, namely research that aims to determine the relationship between two or more variables with a data collection process that is only carried out once for each research variable (Notoatmodjo, 2019). The approach used is cross-sectional, namely research in which independent variables and dependent variables are measured simultaneously and carried out for a moment or once (Nursalam, 2019).

RESULTS

General Data
Respondent Characteristics Based on Respondent Age

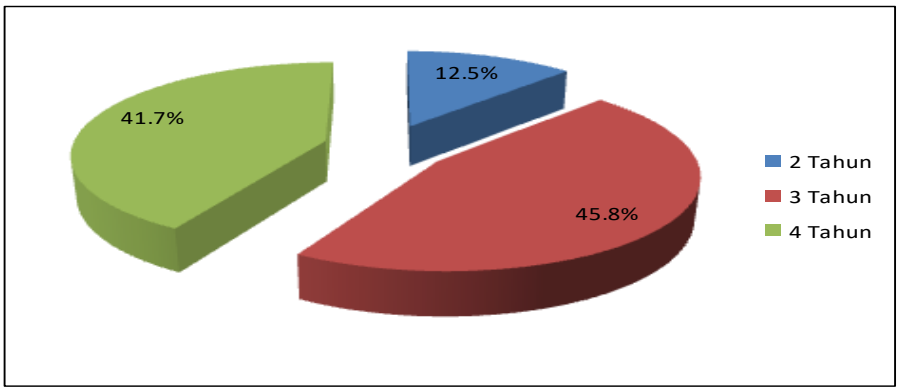

Diagram 4.1 Characteristics of Respondents Based on Age.
Based on diagram 4.1, it is known that of the 24 respondents, almost half of the respondents were 3 years old, namely 11 respondents (45.8%).

Respondent Characteristics Based on Gender

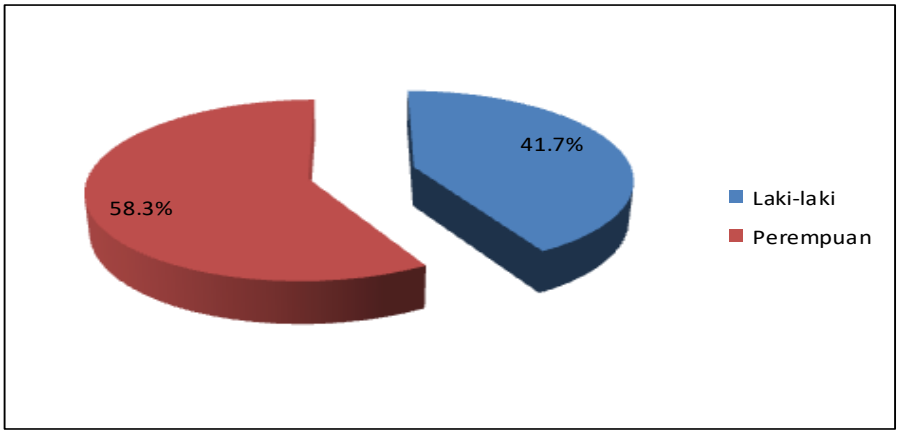

Diagram 4.2 Characteristics of Respondents Based on Gender
Based on diagram 4.2, it is known that of the 24 respondents, the majority of respondents were female, namely 14 respondents (58.3%).

Custom Data

Identify Energy Consumption

Table 1. Tabulation of Energy Consumption Identification in Preschool Children (Age < 5 Years)

No	Energy Consumption	Frequency	Percentage
1	Not accordance	6	25,0%
2	In accordance	18	75,0%
	Amount	24	100%

Based on table 1, it is known that out of 24 respondents, most of the respondents have appropriate energy consumption, namely 18 respondents (75.0%). While there are only 6 respondents (25.0%) with inappropriate energy consumption.

Identify Protein Consumption

Table 2. Tabulation of Protein Consumption Identification in Preschool Children (Age < 5 Years)

No	Energy Consumption	Frequency	Percentage
1	Not accordance	6	25,0%
2	In accordance	18	75,0%
	Amount	24	100%

Based on table 2, it is known that of the 24 respondents, the majority of respondents had appropriate protein consumption, namely 18 respondents (75.0%).

Identify Nutritional Status

Table 3. Tabulation of Nutritional Status Identification in Preschool Children (Age < 5 Years)

No	Nutritional Status	Frequency	Percentage
1	Very Skinny	0	0,0
2	Skinny	5	20,8
3	Normal	17	70,8
4	Fat	2	8,3
5	Obesity	0	0,0
	Amount	24	100%

Based on table 3, it is known that of the 24 respondents, the majority of respondents have normal nutritional status, namely 17 respondents (70.8%).

Relationship between Energy Consumption and Nutritional Status

Table 4. Tabulation of the Relationship between Energy Consumption and Nutritional Status

Energy Consumption	Nutritional Status						Total	
	Skinny		Normal		Fat			
	F	%	F	%	F	%	F	%
Not accordance	5	83,3	1	16,7	0	0,0	6	100
In accordance	0	0,0	16	88,9	2	1,1	18	100
Amount	5	20,8	17	70,8	2	8,4	24	100

Based on table 4, it is known that of the 6 respondents who did not meet energy requirements, almost all of them (83.3) had a thin nutritional status, while of the 18 respondents who met energy requirements, almost all of them had a normal nutritional status.

Relationship between Protein Consumption and Nutritional Status

Table 5. Tabulation of the Relationship between Protein Consumption and Nutritional Status

Energy Consumption	Nutritional Status						Total	
	Skinny		Normal		Fat			
	F	%	F	%	F	%	F	%

Not accordance	5	83,3	1	16,7	0	0,0	6	100
In accordance	0	0,0	16	88,9	2	1,1	18	100
Amount	5	20,8	17	70,8	2	8,4	24	100

Based on table 5, it is known that of the 6 respondents who did not meet protein requirements, almost all of them (83.3) had a thin nutritional status, while of the 24 respondents who met protein requirements, almost all of them had a normal nutritional status.

Analysis of Energy and Protein Consumption on Nutritional Status

Table 6. Analysis of Energy and Protein Consumption on Nutritional Status in Preschool Children (Age < 5 Years)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.014	1	4.014	33.819	.000[a]
	Residual	2.611	22	.119		
	Total	6.625	23			

a. Predictors: (Constant), Energy Consumption, Protein Consumption

b. Dependent Variable: Nutritional Status

DISCUSSION

Based on data analysis using linear regression test to determine the effect of energy and protein consumption on nutritional status in preschool children (age <5 years), the sig value (2-tailed) or pvalue = 0.000 and the error rate or = 0.05, so p <, 0.006 <0.05 so that H1 is accepted, meaning that energy and protein consumption on nutritional status in preschool children (age <5 years).

The findings of this review emphasize the significant relationship between energy and protein consumption and the nutritional status of preschool-aged children in early childhood education settings. Adequate intake of these macronutrients is crucial during the first five years of life, as it directly supports rapid physical growth, brain development, and immune function. Several studies reviewed consistently demonstrated that children with insufficient energy and protein intake were more likely to experience stunting, wasting, or underweight conditions, which may have long-term effects on their health and cognitive performance.

Furthermore, the reviewed literature highlights the importance of considering both quantity and quality of food provided in early education settings. Many programs may meet caloric requirements but fall short in providing high-quality protein sources, leading to imbalanced nutrition. Protein quality, in particular, plays a key role in muscle development and enzymatic functions, and diets low in essential amino acids can impair overall growth. This finding suggests the need for not only sufficient food portions but also careful planning of meals that include diverse and nutrient-dense options.

Socio economic factors also emerged as important moderators of nutritional outcomes. Children from lower-income families often rely heavily on meals provided at preschool or daycare centers, making these institutions critical venues for nutritional interventions. Studies included in this review suggest that nutritional disparities can be mitigated through structured meal programs and targeted education for caregivers and staff about age-appropriate dietary needs. Thus, school-based nutrition policies must be tailored to address these disparities effectively.

Moreover, the review identified several methodological challenges in assessing nutritional intake and status, such as reliance on caregiver recall and inconsistent anthropometric measurement practices. These limitations may affect the accuracy and comparability of

results across studies. Future research should adopt more standardized tools for dietary assessment and consider integrating biomarkers to strengthen the evidence base. Enhancing data quality will be crucial for informing policy decisions and designing effective interventions.

In conclusion, the relationship between preschoolers' energy and protein intake and their nutritional status is well-documented, yet influenced by a range of dietary, environmental, and socioeconomic factors. Early childhood education settings play a pivotal role in shaping dietary habits and ensuring adequate nutrition. Stakeholders, including educators, health professionals, and policymakers, must collaborate to implement comprehensive nutrition programs that address both macronutrient adequacy and dietary equity. Continued research and investment in nutrition-focused policies will be vital in promoting optimal growth and development among children under five.

CONCLUSION

1. Most respondents have appropriate energy consumption, namely 18 respondents (75.0%)
2. Most respondents have appropriate protein consumption, namely 18 respondents (75.0%)
3. Most respondents have normal nutritional status, namely 17 respondents (70.8%)
4. There is an influence of energy and protein consumption on nutritional status in preschool children (age <5 years)

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