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The Impact of Consumption of Protein and Carbohydrate Sources on Stunting in Toddlers 24-59 months at Gleno Inpatient Health Center, Ermera Municipality, Timor-Leste

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Abstract

Stunting is a serious condition that affects children and significantly hinders their growth and development. Globally, at least 162 million children under the age of five are affected by stunting. A study conducted between 2020 and 2024 involved 177 children aged 24 to 59 months, including 85 boys and 92 girls. The study aimed to investigate the impact of protein and carbohydrate intake on stunting in toddlers within this age range.

This research utilized a quantitative design with a cross-sectional approach. The target population consisted of mothers who brought their children to the Gleno Inpatient Community Health Center, resulting in 177 respondents. Data analysis was performed using the chi-square test, with support from SPSS software (Version 21.0).

The results of the chi-square test indicated a significant relationship between protein intake and the incidence of stunting, with a p-value of 0.05, which is greater than 0.01. Similarly, the analysis of carbohydrate intake also yielded a p-value of 0.05, suggesting a significant relationship between carbohydrate consumption and the incidence of stunting.

In conclusion, the findings suggest that protein and carbohydrate consumption negatively impact stunted children aged 24 to 59 months at the Gleno Inpatient Health Center in 2024, with an effect size of 6.3%. This implies that while nutritional intake appears to be satisfactory, the implementation of interventions to address stunting is not optimal.

Keywords— **Protein, Carbohydrate, Stunting**

INTRODUCTION

Childhood stunting is one of the most significant barriers to human growth and development, affecting an estimated 162 million children under the age of five worldwide. Stunting is defined as a height that is more than two standard deviations below the World Health Organization (WHO) average for child growth. It results from chronic malnutrition over time and can cause permanent damage to a child's growth and development, often manifested as a shorter stature. Notably, 80% of brain development occurs in the first two years of a child's life, primarily within the mother's brain (Carvalho et al., 2024). Stunting accumulates during pregnancy and throughout a child's life. During early childhood, stunting can occur, highlighting the importance of proper nutrition in the first pregnancy (Mohseni & Aryankhesal, 2020). Nutritional factors affecting mothers before and during pregnancy significantly influence the development and growth of babies with intrauterine growth restriction. (Exposto et al., 2025). Babies may be born with malnutrition, facing challenges that can hinder their growth and development, which may not ensure optimal health during their first two years. (Amaral, 2024).

Data on global stunting, particularly in children, paints a concerning picture. In 2022, it was estimated that 149 million children under the age of 5 were stunted (meaning they were too short for their age), while 45 million were wasted (too thin for their height), and 37 million were

either overweight or living with obesity. Stunting rates vary by region, but it is especially alarming in areas with high levels of malnutrition. In Asia and Oceania, approximately 22.9% of all children under 5 years old were stunted in 2020, as measured by age (WHO, 2024). Inadequate nutrition for pregnant women is one of the factors that influence stunting. (Aisyah et al., 2024). Providing education or direct intervention to prevent stunting before pregnancy is crucial for ensuring that individuals can become healthy mothers in young adulthood. (Pardamean et al., 2024). Timor-Leste has a higher stunting rate in boys (52.0%) compared to girls (46.6%). Additionally, the prevalence of stunting is greater in rural areas (52.5%) than in urban areas (39.8%), as noted in previous studies. In the RAEOA region, the rate is even higher at 57.1%. Furthermore, children whose parents have low levels of education are more likely to experience stunting (Carvalho et al., 2026; TLFNS, 2020)

Malnutrition rates are higher among rural children, boys, and children with thin mothers. Although children of wealthier and more educated mothers tend to be at a lower risk of stunting, this difference is not statistically significant. Interestingly, breastfeeding practices are better among poorer and less educated women. The variety of complementary foods available for children is limited, and vaccination coverage is low in Timor-Leste. While most households have access to safe drinking water, children from poorer families who rely on unprotected water sources face a higher risk of stunting (Hall et al., 2020).

The results of the 2020 Timor-Leste Food Nutrition Survey, released in February 2021, indicated that a significant majority of children under the age of five suffer from stunting. The findings revealed that nearly all municipalities in Timor-Leste present high stunting rates when compared to national standards, with each municipality showing a rate of over 20%. Notably, the Municipality of Ermera has the highest stunting rate, at 63.4%. This alarming percentage suggests that a considerable number of children are at risk of future health issues, particularly in high-risk communities, far exceeding the acceptable threshold of 20% (TLFNS, 2020).

Protein is a vital nutrient that the human body needs for development and growth. It plays a key role in strengthening the body and providing energy. We typically obtain protein from the foods we consume, particularly from animal sources such as meat, milk, and fish. Additionally, plant-based sources of protein, including nuts and beans, contribute to our overall protein intake (Joye, 2019). Carbohydrates are a source of calories, a basic and cheap source of energy for people all over the world, and nutrients composed of flour, nuts, bananas, tubers, and these foods can provide strength for our bodies to carry out various activities. (FAO et al., 2024). The Timor-Leste Food Nutrition Survey, 2020, showed that the proportion of consumption of various food groups for children aged 24-59 months included nuts at 31%, eggs at 42.6%, meat at 23.1%, fruits and vegetables rich in vitamin A at 71.5%, and other fruits and vegetables at 56.6%. (TLFNS, 2020). Ermera is one of the districts with high stunting in Timor-Leste. The study aimed to determine the impact of protein and carbohydrate nutrition sources consumption on stunting in toddlers 24-59 months at Gleno Inpatient Health Center, Ermera Post Administrative, Municipio Ermera, 2024.

RESEARCH METHODS

This study uses a quantitative design with a cross-sectional approach. This approach is carried out using a cross-sectional method, employing a descriptive study design, which is a problem-solving-oriented method to describe the results of this study. The application of this method aims to investigate current issues. The target population consists of mothers with toddlers aged 24-59 months, totaling 64 mothers. To obtain samples in this study, the researcher used the accidental sampling technique. The researcher will use the Accidental Sampling technique. Accidental Sampling is a method of collecting data where patients met by researchers at the research location can be used as samples or respondents. (Adiputra et al., 2021). The accidental technique used is also based on the Inclusion Criteria: Parents who have children aged 24-59 months, Respondents who agree to be respondents, and children who are not seriously ill. Exclusion Criteria: Children with disabilities, other family members who bring children to health

services. The instruments used in this study were High Measure and a questionnaire. Data were analyzed using the chi-square test supported by software with SPSS Version 21.0.

RESULTS AND DISCUSSION

Table 1. Characteristics of respondents

Age	Frequency	%
20-29	28	44
30-39	20	31
40-49	15	23
50-59	1	2
Level of Education		
No school	18	28
Primary	19	30
Senior high school	14	22
Bachelor's degree	13	20
Profession		
Housewife	48	75
Employed	16	25

The results show that the majority of respondents are between the ages of 20-29 (44%), 30-39 (31%), 40-49 (23%), and 50-59 (2%). The percentage of respondents without formal education is 18 (28%), followed by 19 (30%), 10 (16%), and 13 (22%). The profession of housewife is indicated by 48 (75%), while the profession of employee is indicated by 16 (25%). The percentage of respondents without formal education is also high, with 18 (28%), 19 (30%), 10 (16%), and 13 (22%).

Bivariate Analysis

Table 2. Bivariate Analysis of Variables Results

Variable	Stunting						Total		P=Value
Protein	**Short**		**Shorter**		**Normal**				
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Good	0	0,0	3	4,7	0	0,0	3	4,7	
Bad	53	82,8	4	76,3	4	6,3	61	95,3	0,001
Total	53	82,8	7	10,9	4	6,3	64	100	
Carbohydrate									
Good	53	0,0	6	9,4	0	0,0	6	9,4	
Bad	53	82,5	1	1,6	4	6,3	58	90,6	0,00
Total	53	82,8	7	10,9	4	6,3	64	100	

The researcher conducted a study comparing the relationship between protein and carbohydrates in toddlers aged 24-59 months at Centro Saude inpatient Gleno in 2024. The analysis revealed a significant impact of protein and carbohydrates on stunting incidence. The results of the chi-square test showed a P value of 0.05>0.01, indicating a significant impact of protein nutrient source on stunting incidence. The p-value of 0.05>0.00, on the other hand, indicated a significant impact of nutrient source and

carbohydrates on stunting incidence. The findings suggest that nutrient sources and carbohydrates play a crucial role in preventing stunting in toddlers aged 24-59 months.

Discussion

Impact of Consumption of Protein Nutrition Sources on Stunting

Ensuring that children receive adequate protein is vital for their growth and development. A recent study conducted at the Gleno Inpatient Health Center in 2024 revealed striking insights about children's nutritional intake and its effects on their physical stature. Among mothers categorized as having good protein consumption, a notable 32% perceived their child's height as "short," while only 3% deemed it "normal." Additionally, an overwhelming 82.8% of these mothers expressed concerns, viewing their child's height as "not good short," suggesting a significant level of anxiety regarding their children's growth. The analysis employed a chi-square test, which indicated a statistically significant correlation between protein intake and stunting among children aged 24 to 59 months. This finding underscores the importance of nutrition in early childhood, particularly in this region. Furthermore, the study highlights that mothers in this community, located in the Posto Administrative of Ermera, Municipio Ermera, are generally at an ideal age for family planning, yet they frequently contend with issues related to malnutrition, prominently manifested as stunting in their children. This underscores an urgent need for nutritional interventions to support these families and promote healthier outcomes for their children.

The previous study found that cereal protein scores are often low due to poor amino acid composition, which hinders protein digestion. Protein digestion is influenced by both internal and external factors. External factors include the presence of antinutrients and their physical inaccessibility, which can be caused by being trapped within intact cell structures. On the internal side, the amino acid sequence of the protein is crucial. The variety of food processing techniques aims to enhance overall digestibility, although some processing methods can actually lead to reduced digestibility. (Magno et al., 2025).

Some studies indicate that the quality of an overall diet may vary based on the sources of protein consumed. Specifically, consuming less than 70% of protein from animal sources could result in a better score on the Healthy Eating Index (HEI). Future research on the relationship between protein sources and disease risk should consider overall dietary quality as a potential factor that modifies these effects. (Chester M. Sokolowski, Simon Higgins, egha Vishwanathan, 2020). Consuming 30 grams of a plant-based protein blend made from wheat, corn, and pea protein enhances the rate of muscle protein synthesis in healthy individuals. The response of muscle protein synthesis after consuming this 30-gram plant-based protein blend is comparable to that of consuming an equivalent amount of high-quality animal protein. (Pinckaers et al., 2022).

The role of mothers during the crucial developmental phase is vital in preventing stunting in children. It is recommended that the Health Center and District Health Service implement health promotion programs aimed at increasing awareness, encouraging healthy food practices, and collaborating with relevant institutions to address the issue of stunting in Timor-Leste (Carvalho et al., 2024). A mother's knowledge and characteristics are closely linked to stunting occurrence. Providing education for mothers is vital to preventing stunting in children. (Aticeh, Gita Nirmala Sari, 2023).

Impact of Consumption of Carbohydrate Nutrition Sources on Stunting

Research on weaning treatments for toddlers has found that incorporating local foods can reduce the incidence of stunting. However, proper control is essential in training programs that focus on introducing and processing local food ingredients. This training should be established before implementing food therapy for children under five, as other preparatory programs must be completed first. (Pratiwi, 2023).

The comprehensive study engaged 64 respondents and uncovered notable insights into the nutritional practices surrounding carbohydrate intake. Among them, a striking 44% were found to provide their children with poor-quality carbohydrates, while the remaining 56% opted for

high-quality alternatives aimed at mitigating stunting in their toddlers. Encouragingly, a substantial 90% of the respondents reported that their children were experiencing normal growth, indicating some level of nutritional adequacy. A thorough chi-square test highlighted a significant correlation between the type of carbohydrates consumed and instances of stunting in toddlers aged 24 to 59 months at the Gleno Inpatient Health Center. These findings emphasize a critical gap in knowledge among mothers regarding the proper preparation and processing of carbohydrates, which is essential for fostering optimal growth and development in their young children. This underscores the urgent need for increased education on the vital link between carbohydrate quality and stunting, shedding light on an important aspect of early childhood health and nutrition.
A previous study indicates that the stunting and underweight status of children under the age of five are significantly affected by the type and quantity of food they consume. Food security refers to the ability of individuals or communities to access safe and nutritious food.
Additionally, it was observed that 23.7% of stunted children at Dom Aleixo Post Administrative had low carbohydrate intake. (Magno et al., 2025). The nutritional status of children affects their head growth; better nutritional status leads to improved head growth. With adequate nutrition, a child's needs are met, resulting in healthy head development. (Saputro et al., 2023)

CONCLUSION

Based on the research objectives, the conclusions indicate that poor consumption of nutritional resources and carbohydrate intake (at 6.3%) generally has a positive effect on overall nutritional resource consumption. However, the implementation of the intervention is inadequate. This study focuses on children aged 24 to 59 months who are experiencing stunting at the Gleno Inpatient Health Center in Ermera Post Administrative, Ermera Municipality, in 2024.

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