

Nutrition Adequacy Level and Stunting in Children Aged 48–59 Months in the Coastal Area of Kendari City, Indonesia

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ABSTRACT

This study aims to explore the relationship between nutritional adequacy and height-for-age z-scores (HAZ) in toddlers in Kendari City's coastal region. This cross-sectional analysis involved 96 children aged 48–59 months. Height measurements was converted to HAZ, while a 24-hour dietary recall was conducted to assess nutritional intake. Data were analyzed using Pearson product moment test and multiple linear regressions. The study revealed a significant HAZ correlation with calcium, iron, and copper adequacy levels ($p < 0.05$). Notably, in Kendari City's coastal area, stunting is found in toddlers aged 48–59 months due to nutritional inadequacy.

Keywords: calcium, copper, iron, preschool children, stunting

INTRODUCTION

Stunting is characterized by a height-for-age index less than minus two standard deviations (-2 SD). According to the 2018 Basic Health Research (Riskesdas), the prevalence of stunting in children under five is 30.8% in Indonesia and 28.7% in Southeast Sulawesi Province (MoH RI) 2018). The prevalence of stunting in under-five toddlers in Kendari City, the capital city of Southeast Sulawesi province, is 19.5%. Three major Community Health Centers (CHC) with the highest stunting under-five prevalence are located in Kendari City's coastal area, namely Abeli (0.81%), Nambo (0.71%), and Mata Health Center (0.35%) (Dinas Kesehatan Kota Kendari 2019). A lack of dietary adequacy causes stunting. In linear growth, micro and macronutrients are required. This research investigated the correlation between nutritional adequacy and Height-for-Age Z-scores (HAZ) of toddlers aged 48 to 59 months in Kendari City's coastal areas.

METHODS

This was a cross-sectional study. The research was carried out from November to December 2021. The study was conducted at the Abeli, Nambo, and Mata CHC. The Cochran

formula was used to calculate the number of research subjects; the calculation resulted in 96 children aged 48–59 months. The research subjects were selected using a random sampling procedure. In this study, the independent variable was nutritional adequacy, while the dependent variable was HAZ in children aged 48–59 months. Daily nutrient consumption was compared with the Recommended Dietary Allowances (RDA) and multiplied by 100 percent. The percentage indicated the nutrition adequacy level. Data on nutritional intake were gathered using the repeated 24-hour recall procedure, including one weekday and one weekend. HAZ was determined by measuring height using a SECA 213 stadiometer with 0.1 cm of precision. The z-score was computed using the WHO-Anthro 2005 software. The correlations between nutrient adequacy levels and HAZ were analyzed using Pearson product-moment and multiple linear regression analyses.

RESULTS AND DISCUSSION

This study included 96 participants, divided equally between boys and girls. Twenty-three (24%) of them had a lower birth weight, while 73 children (76%) had a normal birth weight. The results indicate that 30 children (31.2%)

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have stunted growth, with an average HAZ of -1.55. Neonatal short stature suggests intrauterine growth retardation due to fetal malnutrition (Hidayati 2021). Table 1 depicts the correlation between nutritional adequacy and HAZ.

Adequate intake of calories, protein, carbohydrates, vitamin A, D, B2, B5, and B12, calcium, magnesium, phosphorus, iron, zinc, and copper were positively correlated with HAZ ($p < 0.05$) (Table 2). This underlines how insufficient diet in these nutrients can hinder proper linear growth. Micronutrients are vital for smooth physiological (cellular and molecular) functions. Fat, vitamin B1, B3, B9, and iodine adequacy levels do not show a significant HAZ association ($p > 0.05$). Table 2 presents factors

related to stunting in toddlers aged 48–59 months in Kendari City.

Adequacy levels of calcium, iron, and copper were correlated with stunting in toddlers aged 48–59 months in Kendari City ($p < 0.05$). Calcium, phosphorus, and magnesium crucially form bone structures and aid mineralization. Moreover, these elements contribute to bone matrix deposition and influence osteoblast metabolism in growth plates during bone growth (Ramadhani *et al.* 2019). Copper is vital for bone and cartilage metabolism, acting as a cofactor for lysyl oxidase, the main enzyme in bone collagen creation, and enhancing connective tissues while boosting calcium, phosphorus, and collagen synthesis (Yin *et al.* 2017).

Table 1. The relationship between nutritional adequacy and HAZ in children aged 48–59 months

Variables	Mean±SD	r	p*
(% RDA)	60.72±23.70	0.259	0.011
Protein (% RDA)	104.21±43.17	0.206	0.044
Fat (% RDA)	55.34±32.54	0.142	0.166
Carbohydrate (% RDA)	57.79±24.69	0.296	0.003
Vitamin A (% RDA)	67.59±71.02	0.999	0.000
Vitamin D (% RDA)	35.27±29.32	0.996	0.000
Vitamin B1 (% RDA)	42.04±20.38	0.075	0.468
Vitamin B2 (% RDA)	85.95±39.47	0.238	0.020
Vitamin B3 (% RDA)	56.25±36.145	0.058	0.577
Vitamin B5 (% RDA)	84.3±53.68	0.228	0.026
Vitamin B9 (% RDA)	31.26±15.24	0.198	0.054
Vitamin B12 (% RDA)	140.61±114.66	0.999	0.000
Kalsium (% RDA)	22.87±31.42	0.242	0.018
Magnesium (% RDA)	114.51±64.79	0.225	0.027
Fosfor (% RDA)	102.98±52.02	0.240	0.018
Iron (% RDA)	35.13±33.09	0.993	0.000
Zinc (% RDA)	62.16±32.46	0.251	0.014
Copper (% RDA)	83.42±68.59	0.225	0.028
Iodine (% RDA)	0.15±0.36	-0.145	0.160

*Pearson product moment test; RDA: Recommended Dietary Allowance; HAZ: Height-for-Age Z-score

Table 2. Factors associated with stunting in toddlers aged 48–59 months in Kendari City

Variables	Unstandardized coefficients	p**	Constant	Adjusted R-squared
Carbohydrate adequacy levels	0.009	0.062	-2.017	0.161
Calcium adequacy levels	0.016	0.019		
Iron adequacy levels	-0.009	0.045		
Copper adequacy levels	0.005	0.028		

**Multiple linear regression test

CONCLUSION

Calcium, iron, and copper adequacy levels are the most significant factors related to stunting in toddlers aged 48–59 months in Kendari City.

DECLARATION OF CONFLICT OF INTERESTS

The authors have no conflict of interest.

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