

EFFECTIVENESS OF ZINC SUPPLY ON WEIGHT IN TODDLERS AGED 2-5 YEARS

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ABSTRACT

The problem of tissue deterioration due to malnutrition is usually characterized by weight loss and stunted development. This study aims to determine the effectiveness of zinc supplementation on weight gain for toddlers aged 2-5 years. This study used a quasi-experimental method with a pre-test - post-test design in one group. The sampling technique used purposive sampling. The sample of toddlers aged 2-5 years was 52 respondents. This study used the Wilcoxon Test. The results of the study after the intervention for 30 days, most experienced weight gain as many as 32 children (82%) and those whose weight remained as many as 7 children (18%). The statistical test obtained a p value = 0.001 so that $p < 0.05$, which means there is effectiveness of zinc syrup supplementation on weight gain for toddlers aged 2-5 years at TPMB Indra Wahyu. This study recommends providing zinc to toddlers with underweight and severely underweight nutritional status regularly once a day as much as 10 mg (5 ml) while still consuming nutritious food as a source of nutrition for toddlers.

Keywords: Increased Weight in Toddlers, Zinc Syrup

1. INTRODUCTION

Growth and development are continuous processes from conception to maturity, influenced by both genetic and environmental factors. Growth refers to changes in size, while development relates to differentiation of form or function, including emotional and social changes. Several factors influence food intake, including eating habits and preferences for certain foods, which persist into adulthood and are often difficult to correct. Eating problems in children can negatively impact their growth and development. The amount of food consumed by a child can indicate a risk of malnutrition (Sudarman et al., 2021).

Nutritional deficiencies cause the body's food reserves to be used to meet metabolic needs. Tissue depletion occurs when nutrient reserves are used over a prolonged period. When this tissue depletion occurs, a person is considered malnourished, typically characterized by weight loss and stunted development (dr Meitria Syahadatina Noor et al., 2021) (Saranani et al., 2023).

From the monitoring results of the Indonesian Nutrition Status Survey Team (INSS) which is carried out every year, the results of the prevalence of underweight toddlers (Body Weight/Age) from 2021 - 2022 nationally have increased from 17.0% in 2021 to 17.1% in 2022. For the East Java region from 2021 - 2022 there has been a decrease, namely from 16.1% in 2021 to 15.8% in 2022. Specifically for the Malang district area, the prevalence of underweight toddlers (Body Weight/Age) from 2021 - 2022 has

decreased from 14.5% in 2021 to 13.4% in 2022 (BKPK, 2023).

Based on data obtained from the 2023 Indonesian Health Survey (IHS), the prevalence of severely underweight toddlers was 2%, and underweight 11.3%, out of 39,162 toddlers. Meanwhile, in Malang Regency, the prevalence of underweight toddlers was 13%, out of a total of 2,507 toddlers (n.d, 2023).

Based on the study In a preliminary survey at Independent Midwife Practice Place Indra Wahyu, 3-4 mothers of toddlers reported that their toddlers had not gained weight in the past 2-3 months. The mothers of toddlers reported that their children's eating patterns were as usual, 2-3 times per day with side dishes usually consisting of eggs, sausages, nuggets, fried chicken, and tofu and tempeh. Seven out of 10 mothers of toddlers reported that their children did not like fruits and vegetables. Based on the above data, the author is interested in conducting research to prove the effectiveness of zinc supplementation on weight gain at Independent Midwife Practice Place Indra Wahyu. Research conducted by Risful Maulida et al. in 2019 showed that the combination of zinc syrup and Modisco was highly effective in increasing the weight of toddlers with PEM (Maulins & Aksohini Wijayanti, 2019).

This nutritional deficiency can be addressed by administering zinc. Zinc aids metabolism and enzyme activity, one of which is improving enzyme function. When enzymes function properly, food intake is easily absorbed and functions optimally, aiding growth. Supplementing with zinc syrup is

expected to increase body weight because it accelerates metabolism (Astuti et al., 2021).

2. METHODS

This study used a Quasi-experimental research design with a pre-test - post-test design (Nurlan, 2019). With a purposive sampling technique, a sample of 52 respondents was obtained, the independent variable was zinc syrup and the dependent variable was pre- and

Variables	Operational Definition	Parameters/Indicators	Measurement Instrument	Data Scale	Category
Body Weight (BB)	Weighting results at PMB Nur Afida	Z Score	BB Scale	Ratio	BB Pre-supplementation (kg) BB Post-supplementation (kg)
Frequency of Zinc Syrup	The action of administering zinc syrup to respondents at a dose of 10 mg/day for 1 month	-Pre Supplementation -Post Supplementation	Zinc syrup with a spoon, given after meals	-	-

post-supplementation weight measurement. The Wilcoxon statistical test was used to determine the relationship between the two variables. Analysis using the Wilcoxon statistical test obtained $p = 0.001 < 0.05$, so H_0 was rejected and H_a was accepted, which

means there was a difference in the provision of zinc syrup on changes in the weight of toddlers aged 2-5 years at at Independent Midwife Practice Place Indra Wahyu.

3. RESULTS

This study used a quasi-experimental research design with a pre-test-post-test design. Using purposive sampling, a sample of 52 respondents was obtained. The independent variable was zinc syrup and the dependent variable was pre- and post-supplementation weight measurement. This study has undergone ethical clearance with the number 001909/EC/KEPK/I/12/2024. Inclusion and exclusion criteria were met. The inclusion criteria are as follows:

- 1) Toddlers aged 2-5 years
- 2) Toddlers with low body weight (based on the Z score assessment of the BB/U category with results $< -2SD$)
- 3) Willing to be a respondent

Exclusion criteria are:

- 1) Toddlers undergoing zinc treatment
- 2) Toddlers born prematurely.
- 3) Toddlers who are not taking other vitamins
- 4) Toddlers who are intolerant to zinc
- 5) Respondents who did not reach the target dose in zinc consumption (full 30 days)
- 6) Toddlers who experience excessive nausea, vomiting or diarrhea as a side effect of zinc consumption.
- 7) Sick toddler during zinc supplementation intervention

The operational definitions of the variables in this study are explained in the following table. **Table of Operational Definitions of Research Variables**

The statistical test used in this study was the Wilcoxon test to determine the relationship between the two variables. Analysis using the Wilcoxon statistical test resulted in $p = 0.001 < 0.05$, so H_0 was rejected and H_a was accepted, meaning there was a difference in the administration of zinc syrup on changes in the weight of toddlers aged 2-5 years at TPMB Indra Wahyu.

RESEARCH RESULT

Table 1 Distribution of Respondent Characteristics and Variables

Research result	Frequency (f)	Percentage (%)
Gender		
Man	18	46.20
Woman	21	53.80
Child Sequence Status		
The first child	15	38.50
Second child	13	33.30
The third child	7	17.90
More than 3	4	10.30
Mother's Education		
Elementary School	6	15.40
Junior High School	13	33.30
Senior High School	20	51.30
PT	0	0%
Work		
Housewife	34	87.20%
Worker	5	12.80%

Source: Research Questionnaire, December 9, 2024

The table above shows that most respondents were first-born daughters, and their mothers were housewives.

Table 2 Respondent Characteristics Based on Changes in Body Weight Pre & Post Supplementation

Responden	BB pre	BB Post	N/T	Status Gizi
R1	7,3	8,1	N	SU
R2	7,5	8,2	N	SU
R3	7,8	8,5	N	U
R4	8	8,5	N	U
R6	8,1	9,3	N	U
R7	8,2	8,5	N	SU
R8	8,2	9,1	N	SU
R9	8,2	8,9	N	SU
R12	8,2	8,8	N	SU
R13	8,3	9,1	N	SU
R14	8,4	9,2	N	SU
R16	8,7	9,5	N	SU
R17	8,9	10	N	SU
R18	8,9	9,7	N	SU
R19	9	9	T	U
R20	9	9,9	N	U
R21	9,1	10,4	N	U
R23	9,1	9,9	N	U
R25	9,3	9,5	N	U
R26	9,3	9,6	N	U
R27	9,6	10,4	N	U
R28	9,7	10	N	SU
R30	9,8	10,3	N	SU
R32	10	10	T	U
R33	10,2	10,9	N	U
R34	10,2	10,8	N	U
R35	10,3	10,3	T	U
R36	10,3	11,1	N	U
R38	10,4	10,4	T	U
R39	10,4	10,4	T	U
R40	10,7	11,5	N	U
R41	10,7	11,8	N	U
R42	10,7	11,5	N	U
R43	11	11	T	U
R44	11,5	12,3	N	U
R47	11,6	12,9	N	U
R48	12	13	N	U
R49	12,3	12,3	T	U

R52	14,4	15,7	N	U
Source:	Research	Questionnaire,		
December 9, 2024				

Based on the table above, it is known that from 39 respondents, the results showed that the majority of respondents experienced an increase in body weight.

Table 3 Analysis of Research Statistical Test Results

Variables	N	Percentage
BB Changes		
Go on	32	82.05%
Down	0	0%
Still	7	17.95%
Post-Supplementation-Pre-Supplementation	Z	-3.816b
	Asymp. Sig. (2-tailed)	<,001

The results of the research analysis on the effectiveness of giving zinc syrup to toddlers aged 2-5 years at Independent Midwife Practice Place Indra Wahyu based on statistical tests using the Wilcoxon test obtained the results of $p < 0.001$, so H_0 was rejected and H_a was accepted, which means there is a difference in giving zinc syrup to increase the weight of toddlers aged 2-5 years at Independent Midwife Practice Place Indra Wahyu.

4. DISCUSSION

Identification of Toddler Weight Before Zinc Syrup Supplementation

Factors influencing toddler weight growth include food intake, sanitation, socioeconomic status, employment, and low income, which also impact the fulfillment of basic needs such as food, clothing, and nutrition. Another factor, environmental sanitation, plays a significant role in providing a supportive environment for children's health and

development. Both personal and environmental hygiene play a crucial role in preventing disease (Hatala, 2022) (Wildayani et al., 2018).

A person's nutritional status depends on their nutritional intake and needs. A balance between nutritional intake and the body's needs will result in good nutritional status. Factors influencing toddler weight growth include food intake, sanitation, socioeconomic status, and employment. A low income also affects the ability to meet basic needs such as food, clothing, and nutrition. In terms of maternal education, the majority of mothers in this study had a high school education (51.3%).

This will undoubtedly impact nutritional issues and weight gain in toddlers, as those with higher levels of education will likely understand the importance of nutritious food for their growth. This is exacerbated by toddlers who refuse to eat but are left alone, leading to reduced food intake. This, in turn, exacerbates malnutrition, leading to a plateau or even a decrease in weight.

Identification of Toddler Weight After Zinc Syrup Supplementation

A child's low appetite can be caused by several factors, such as illness, nutritional deficiencies, medication use, and psychological factors (Nisa & Sumarmi, 2024). Nutritional deficiencies, especially micronutrient deficiencies, are common in children. Zinc supplementation can increase plasma concentrations of Insulin-like Growth Factor I (IGF-I), resulting in increased

growth rate. Insulin-like Growth Factor I is a growth hormone mediator.

Decreased IGF-I concentrations are caused not only by protein-energy deficiency but also by zinc deficiency. Clinical manifestations of zinc deficiency in children include decreased appetite, delayed healing of infections, a weakened immune system, and even death.

The study results showed that 21.15% did not consume zinc syrup regularly, and 3.85% suffered from diarrhea during the 30-day data collection period. Zinc plays a vital role in the immune system and is a potential mediator in defending the body against infection.

Zinc affects various aspects of the immune system. Zinc is essential for the development and function of innate cell-mediated immunity, neutrophils, and natural killer cells. Macrophages and cytokine production are all affected by zinc deficiency.

Pre & Post Body Weight Analysis of Zinc Syrup Supplementation

In this study, zinc syrup supplementation can aid metabolism and enzyme activity, improving enzyme function. With proper enzyme function, food intake can be easily absorbed and function optimally, supporting growth. This was evident in the weight changes in children given zinc supplementation.

The analysis of weight gain in children after zinc supplementation showed positive results. Of the 39 respondents, the majority, 32 (82%), experienced weight gain.

Based on the Wilcoxon Statistical Test, $p = 0.001$ was obtained so that $p < 0.05$, which indicates that H_a is accepted, meaning there is a difference in the administration of zinc syrup on changes in the weight of toddlers aged 2-5 years at the Independent Practice of Midwife Indra Wahyu.

Analysis of the Effectiveness of Zinc Supplementation on Toddler Weight Gain

Based on the Wilcoxon statistical test, $p = 0.001$ was obtained, indicating $p < 0.05$, indicating that H_a was accepted, meaning there was a difference in the administration of zinc syrup on weight changes in toddlers aged 2-5 years at the Indra Wahyu TPMB. The results of this study align with the theory that zinc can aid metabolic processes and enzyme activity in the body, one of which is by improving enzyme function. If enzymes function properly, food intake can be easily absorbed and function optimally, supporting growth. Furthermore, zinc, as a micro mineral found in very small amounts in the body, plays a crucial role in many bodily functions. As part of enzymes or as a cofactor in the activity of over two hundred enzymes, zinc plays a role in various aspects of metabolism, such as reactions related to the synthesis and degradation of carbohydrates, proteins, lipids, and nucleic acids. As part of the carboxyl peptidase enzyme found in pancreatic fluid, zinc plays a role in protein digestion (Kasanah & Muawanah, 2020).

Several factors influence food intake, including eating habits and food likes and dislikes, which are carried into adulthood and are often difficult to

correct. This is also true for family environment, peer groups, and illness. Eating problems in children can negatively impact growth and development. A lack of food intake can indicate a high risk of malnutrition (Maulins & Aksohini Wijayanti, 2019).

The selected respondents met the inclusion criteria: toddlers aged 2-5 years old who were underweight (based on a Z-score assessment of the weight-for-age category with a result of <-2 SD).

Analysis of weight gain in children after zinc administration showed a clinical improvement, but it was not statistically significant ($p = 0.001$). This is because healthy toddlers gain 1-1.5 kg per year, while the toddlers in the respondents were malnourished, resulting in slower weight gain than normal children. As research conducted by Rifzul Maulina et al. in 2021 regarding the Effectiveness of Zinc Syrup and Modisco on Weight Changes in Toddlers with Moderate and Severe Protein Energy Deficiency (PEM) in the Jabung Community Health Center Work Area, East Java, showed that the t-test results obtained $p = 0.034$. The Eta Squared obtained was 0.28, concluding that there was a large effectiveness of the combination of zinc syrup and Modisco on increasing toddlers' weight.

5. CONCLUSION

Based on the results of research conducted at Independent Practice of Midwife Indra Wahyu on 39 respondents regarding the effectiveness of providing zinc on increasing the weight of toddlers aged 2-5 years. then it is concluded as follows:

Most of them experienced weight gain, as many as 29 children (74.4%), and a small number of toddlers whose weight remained the same, as many as 10 children (25.6%).

Based on the statistical test using the Wilcoxon test, $p = 0.001$ was obtained so that $p < 0.05$, which indicates that H_a is accepted, meaning that there is effectiveness in giving zinc syrup to increase the weight of toddlers aged 2-5 years.

This study recommends giving zinc to toddlers with underweight and severely underweight nutritional status routinely once a day as much as 10 mg (5 ml) with regular monitoring and consuming nutritious food as a source of nutrition for toddlers.

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