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Effect of Combination Catfish Nuggets and Omega-3 Eggs in Addressing Stunting in Toddlers

Rini Sartika[1)], Nurry Ayuningtyas Kusumastuti[1)], Lastri Mei Winarni[1)]

[1)]Diploma III Program in Midwifery, Faculty of Health Science, Universitas Yatsi Madani, Indonesia

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ABSTRACT

Background: The Indonesian government continues to prioritize efforts to accelerate the reduction of stunting to meet national targets. Ensuring adequate and healthy nutrition during the toddler years is essential for supporting long-term health and development. This study aimed to determine the effect of combination of catfish nuggets and omega-3 eggs in overcoming stunting in toddlers.
Subjects and Method: This study used a true experimental design with a two-group pretest-posttest control group setup. A total of 30 toddlers were selected as samples and evenly divided into two groups of 15 participants each. The intervention group received a combination of catfish nuggets and Omega-3 eggs, while the control group did not receive the intervention over a two-week period. Sampling was conducted using a cluster random sampling technique. Instruments used included a length board to measure height and an observation form to monitor the administration of the catfish nuggets and Omega-3 eggs. Data were analyzed using the Wilcoxon test.
Results: The mean of height for toddlers increased after given combination of catfish nuggets and Omega-3 Eggs (Mean =-2.17; SD= 0.97) compared to before intervention (Mean= -2.52; SD= 0.87), and the results were statistically significant (p<0.001).
Conclusion: Combination of catfish nuggets and Omega-3 Eggs effective is increase the height for toddlers.

Keywords: catfishes, fatty acids, omega-3, growth disorders

Correspondence:
Nurry Ayuningtyas Kusumastuti, Midwivery Program Study, Program Diploma III, Faculty of Science, Yatsi Madani University, Tangerang, Indonesia. Mobile: 085743739007. Email: nurry0067-@gmail.com.

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BACKGROUND

Stunting remains a major concern for Indonesian society, as its prevalence has yet to be significantly reduced. The acceleration of stunting reduction continues to be a priority for the Indonesian government, aiming to achieve the targeted annual reduction rate of 3.4%. In 2022, the stunting rate showed a decrease of 2.8%, which was an improvement compared to 2021. Based on this progress, a total reduction of 7.6% is expected over the next two years (Badan Pusat Statistik, 2022).

Stunting occurs due to prolonged

undernutrition during the first 1,000 days of life. The World Health Organization (WHO) recommends that children aged 6–23 months should receive a variety of foods to meet their nutritional needs. Adequate nutritional intake is crucial for the growth and development of toddlers. Children who previously experienced nutritional deficiencies can still recover with good nutrition (Kementerian Kesehatan RI, 2022).

The prevalence of stunting must continue to be reduced to improve quality of life. Stunting negatively affects children's growth and development. In the short term, it can lead to impaired brain development, body metabolism issues, and physical growth delays, making children shorter than their peers (Fitri and Sartika, 2021; Sartika et al., 2021). In the long term, stunting impacts intelligence, weakens the immune system, increases susceptibility to illness, and raises the risk of chronic diseases such as diabetes, heart disease, stroke, and cancer. These consequences also affect Indonesia's economy, especially through the national health insurance system. Additionally, stunting can decrease intelligence levels by 5–11 IQ points, indirectly contributing to a high proportion of unproductive working-age individuals. Therefore, effective and comprehensive stunting prevention and treatment efforts are essential (Ministry of Health, 2022).

The government has launched various programs to combat stunting. One critical factor in stunting prevention is balanced nutrition. Nutritional needs should be carefully monitored during pregnancy and breastfeeding. Pregnant women are encouraged to regularly attend prenatal check-ups to monitor fetal growth and development. Exclusive breastfeeding is strongly recommended for its benefits in supporting infant growth, development, and immunity. Other contributing factors to stunting include poor sanitation, limited access to clean water, and low maternal knowledge about stunting prevention and management (Linah et al., 2023). Furthermore, health care access for stunting detection and intervention is still uneven across regions. Hence, collaborative efforts from various stakeholders are necessary to overcome stunting in Indonesia (Torlesse et al., 2016).

One approach to overcoming stunting is by stimulating nutrition intake rich in protein. One accessible source of animal protein is catfish (lele), which is not only affordable and widely available but also has a delicious taste. Catfish contains higher levels of essential amino acids than meat. Protein is broken down into 20 essential amino acids, which are vital building blocks for body growth and a source of energy (Robinson and Segal, 2024; American Heart Association, 2021). Catfish also contains omega-3 and omega-6 fatty acids, which help prevent heart disease and improve brain function (Khan et al., 2021).

Current research has explored catfish nuggets as a way to combat stunting, but no studies have combined them with omega-3 eggs. Omega-3 eggs contain essential long-chain polyunsaturated fatty acids (PUFA), including alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). Omega-3 fatty acids play a role in maintaining immune function and are crucial for the growth and development of the nervous system and brain function in toddlers (Hodge et al., 2005).

Given the potential benefits of both protein sources for toddler growth and development, the authors propose an innovation by combining catfish nuggets with omega-3 eggs to help address stunting in toddlers. Therefore, the research problem is defined as: How effective is the combination

of catfish nuggets and omega-3 eggs in overcoming stunting in toddlers.

SUBJECTS AND METHOD

1. Study Design

This study utilizes a true experimental design with a pre-test and post-test control group. The sampling technique applied is cluster random sampling. The research was conducted in the working area of Mauk Public Health Center, Tangerang Regency.

2. Population and Sample

The study sample consists of toddlers aged 1–5 years who are classified as stunted. A total of 30 respondents were selected and divided into two groups: an intervention group (n=15) and a control group (n=15). Toddlers in the intervention group were given 112 grams of catfish nuggets combined with omega-3 eggs daily. Meanwhile, the control group received two boiled eggs per day. Daily observations were conducted for both groups over a 14-day period, and the results were recorded on observation sheets. After 14 days, a post-test was conducted by measuring the toddlers' body weight and height. This study follows a rigorous and systematic procedure to assess the effect of the intervention.

The inclusion criteria for this study were toddlers aged 1–5 years who were identified as stunted, not currently undergoing any medical treatment, and without any congenital abnormalities. The exclusion criteria included toddlers who were classified as obese and those whose parents or guardians refused to allow them to participate in the study.

3. Study Variables

The independent variable is the combination of catfish nuggets and omega-3 enriched eggs. The dependent variable is the incidence of stunting.

4. Operational Definition of Variables

The combination of catfish nuggets and Omega-3 eggs is prepared by processing the catfish into nuggets through breading, battering, and either deep-frying or baking. The catfish used are fed a diet high in Omega-3 fatty acids. Meanwhile, the Omega-3 eggs are prepared by boiling.

Stunting is measured using a length board or stadiometer, which provides accurate measurements of body length or height.

5. Study Instruments

The preparation of the catfish nugget and omega-3 egg combination followed a standard operating procedure. Stunting was measured using a length board or stadiometer by the guidelines from the Indonesian Ministry of Health (Kementerian Kesehatan Republik Indonesia, 2022).

6. Data analysis

The data were analyzed using the Wilcoxon Signed-Rank Test.

7. Research Ethics

This study has been ethically approved and registered under number 313/LPPM-UYM/-XI/2024. It adheres to ethical principles that protect the rights, dignity, and safety of all participants. The research complies with the ethical guidelines established by the Research and Community Service Institute (LPPM) of Universitas Yudha Mandiri and other relevant regulatory bodies.

RESULTS

1. Univariate analysis

Univariate analysis is conducted to provide a general overview of the characteristics of the respondents and the variables studied. In this research, the univariate analysis includes the frequency and percentage distribution of toddler characteristics such as age, sex, and stunting status before and after the intervention. Additionally, it describes the intervention variable, which is the provision of a combination of catfish

nuggets and Omega-3 eggs. The purpose of this analysis is to understand the profile of the respondents and the distribution of the data prior to further analysis

a. Sample Characteristics

The description of the sample characteristics is presented to provide an overview of the respondents' profiles in this study, with a total of 30 respondents. Based on Table 1, a total of 30 toddlers were divided into two groups: the intervention group (n=15) and the control group (n=15). The majority of the subjects were female, totaling 20 toddlers (66.7%), and most were categorized as toddlers, with 23 individuals (76.7%).

Table 1. Sample characteristics

Characteristic	Frequency (N)	Percentage %
Group		
Intervention	15	50
Control	15	50
Sex		
Male	10	33.3
Female	20	66.7
Age Category		
Infant (0–12 mo)	5	16.7
Toddler (13–36 mo)	23	76.7
Child (37–60 mo)	2	6.7

b. Distribution of variables

This type of analysis involved summarizing the data using frequency distributions for both groups before and after the intervention. Table 2 shows that the average height-for-age z-score (HAZ) before the intervention was -2.52 with a standard deviation (SD) of 0.87. After the intervention, the average HAZ improved to -2.17 with an SD of 0.97.

Table 2. Continuous data of subject characteristics

Group	Mean	SD	Median	Min	Max
Before	-2,52	0,87	-2,61	-3.91	-0.89
After	-2,17	0,97	-2,52	-3,77	-0,28

2. Bivariate analysis

Bivariate analysis is used to determine the effect of the combination of catfish nuggets and Omega-3 eggs on stunting status in toddlers. The relationship between the independent variable (provision of the combination of catfish nuggets and Omega-3 eggs) and the dependent variable (stunting status) is analyzed using an appropriate statistical test, namely the Wilcoxon test, to assess differences in stunting status before and after the intervention within each group, as well as to compare the intervention and control groups. The results of the bivariate analysis, presented in Table 3, show a p-value of <0.001, indicating a statistically significant effect of the combination of catfish nuggets and omega-3 eggs in addressing stunting among toddlers. The mean HAZ score increased from -2.52 (SD = 0.87) before the intervention to -2.17 (SD = 0.97) after the intervention.

Table 3. Bivariate analysis of the effect of catfish nuggets and omega-3 egg combination on stunting in toddlers

Group	Mean	SD	p
Before	-2,52	0,87	<0.001
After	-2,17	0,97	

DISCUSSION

The results of the study showed an increase in Z-score of 0.35 over the 14-day intervention period with the administration of a combination of catfish nuggets and omega-3 enriched eggs. This intervention resulted in a positive change in height among stunted toddlers, where the mean Z-score before the intervention was -2.52, and improved to -2.17 post-intervention.

One of the key nutrients that supports height growth in children is protein, which is abundantly found in catfish. Protein plays a vital role in tissue formation and regeneration in the body. It also helps increase levels of Insulin-like Growth Factor I (IGF-I), a hormone that stimulates linear growth in children (Handayani, 2024).

This study demonstrated that the average height-for-age Z-score improved after the toddlers received 112 grams of the catfish nugget and omega-3 egg combination daily for 14 days. These results align with a study by Handayani (2024), which reported a significant difference between pre-test and post-test Z-scores in children aged 12–60 months after being given catfish-based moringa leaf nuggets ($p = 0.012$), indicating a positive effect on height among stunted toddlers.

Contrary to common perception among the Indonesian public, which often attributes short stature to genetics, current research shows that nutritional factors play a far greater role. Genetic factors contribute only about 15% to height, while the remaining influence comes from nutritional intake (Handayani, 2024).

Protein intake is crucial, and catfish offers high-quality protein. It is a widely favored fish in Indonesia and contains essential nutrients such as leucine, lysine, and beneficial fatty acids like omega-3 and omega-6. Catfish protein helps increase body weight and muscle mass (Dermawan, 2022). Given its nutritional benefits, catfish is suitable for modification into supplementary food products, such as catfish nuggets (Rahmawati et al., 2023). Catfish has been reported to contain 12.82% protein, 3.70% fat, 2.60% carbohydrates, and 5.59% calcium, which can all help in preventing stunting (Mubarokah, 2022).

In addition, eggs are a high-quality source of protein, providing all essential amino acids required by the body. Protein is essential for tissue repair, muscle development, and cellular growth. A deficiency in protein may lead to growth issues, including stunting. Eggs are also affordable and easily accessible, making them a staple source of animal protein for many Indonesians (Wijaya and Syafiyullah, 2023). Omega-3 enriched eggs are nutritionally superior to regular eggs. The key difference lies in the yolk color—omega-3 eggs have a slightly reddish yolk, compared to the yellow yolk of regular eggs (Prasetia et al., 2022).

Omega-3 eggs offer health benefits such as reducing inflammation in the retina and optic nerves and improving insulin sensitivity. Moreover, they support brain development in toddlers and help prevent various degenerative diseases, making them a cost-effective, nutrient-dense protein source (Lestari et al., 2021). A study by Lewi et al. (2020) reported that omega-3 fatty acids significantly increased height in

stunted toddlers aged 12–36 months. The intervention group showed significantly greater height gains compared to the control group (p = 0.009294) (Jutomo et al., 2020).

Similarly, another study evaluating the effectiveness of animal protein consumption (from eggs and fish) as a strategy to reduce stunting showed statistically significant results. The analysis of respondents aged 36–48 months showed a p-value of 0.039, indicating a meaningful impact of animal protein intake on stunting status among toddlers (Izah et al., 2024).

These findings support previous research emphasizing the role of animal protein in preventing stunting and challenge the belief that stunting is primarily genetic, highlighting the greater influence of nutrition. Stunting prevention programs should include affordable, protein-rich foods like catfish nuggets and omega-3 eggs. These foods are locally available and well-accepted by the community. Health institutions and local governments are encouraged to promote and distribute such interventions. Public education is also needed to raise awareness about the importance of nutrition and correct misconceptions about stunting.

AUTHOR CONTRIBUTION

Rini Sartika was responsible for obtaining research permissions, task mapping, conducting field surveys, delivering the intervention, performing observations, and managing documentation. Nurry Ayuningtyas Kusumastuti administered the intervention, carried out observations, entered data, performed data analysis, interpreted the results, and wrote the research article. Lastri Mei Winarni provided a critical review of the research concept and validated the research findings.

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This research was self-funded.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research. All activities related to the study, including funding, design, implementation, and reporting, have been conducted transparently and without any influence from external parties that could compromise the integrity of the results.

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