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Original Article

Chicken floss and catfish nuggets supplementary to increasing weight gain in stunted children

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ABSTRACT

Background: Stunted children are not only less tall, but most of them are also underweight. Lack of nutritional intake, especially protein intake, is suspected as one of the factors. Shredded chicken and catfish nuggets have high protein, but the scientific evidence for these food supplements in increasing stunting children's weight is still limited.

Objective: To determine the effectiveness of supplementation chicken floss and catfish nuggets to increase weight gain in stunted children.

Methods: This is a quasi-experimental with a pretest-posttest design; as many as 70 stunted children with underweight participated in this study. Respondents were given supplementation for 14 days. Respondents' weight was monitored before and after. Data were analyzed by pair t-test.

Results: The results of the hedonic test of 30 panelists said that 27 (90%) stated that they received chicken floss, and 28 (90.33%) received catfish nuggets. There was an increase in the average stunting toddler weight after the given supplementation, which was 0.534 kg, ($p < 0.0001$).

Conclusion: Chicken floss and catfish nuggets supplements can increase weight gain in stunted children.

INTRODUCTION

As many as 165 million children under five worldwide are estimated to be affected by stunting.¹ Based on the Indonesian nutritional status survey results, the stunting rate in Indonesia in 2022 is still high a 21.6%. Stunted children are not only less tall, but most of them are also underweight. Being underweight can be caused by insufficient protein needs.² Stunted toddlers have lower protein intake than toddlers who are not stunted.³

One of the efforts to prevent stunting in Indonesia is focused on fulfilling child nutrition in the first 1,000 days of life because it contributes to a 30% reduction in stunting.^{4,5} The level protein adequacy factor is one of the determinants of the incidence of stunting.⁶ Based on the study results, it was reported that giving interventions like giving biscuits based on blondo, snakehead fish, and brown rice

for 90 days can improve the nutritional status and serum albumin levels of nutritional children.⁷ Also, giving Moringa seed and leaf cookies can increase body weight.⁸ Provision of additional food in the form of modification is very significant for improving the nutritional status of toddlers.⁹ Consumption of soy tempeh nuggets is effective against weight gain for undernourished toddlers.¹⁰ Based on the results of other studies, the product of roll cake substitution of red rice flour filled with shredded catfish is preferred. However, this study has only conducted trials on respondents once they determine the effect of a given snack on stunting prevention.¹¹

The community welcomes the introduction of fish nuggets as an innovation in processed fish.¹² Fish is a source of animal protein needed by the body. One of the easiest fish to cultivate is the catfish.¹³ Besides catfish, chicken meat is a potential food ingredient with many nutrients. Chicken

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meat is the best source of protein that can support growth and development for children.¹⁴ The processing of catfish into nuggets and chicken into floss is quite simple and can be done with simple equipment, but the scientific evidence supplementation chicken floss and catfish nuggets increase the weight of stunted children are still limited. This study aims to determine the effect of supplementing chicken floss and catfish nuggets on increasing body weight in stunted children.

METHOD

Study Design

This research is quasi-experimental with a one-group pretest-posttest design.¹⁵

Setting and Respondent

The research was conducted in Blora Regency, Central Java, in October-December 2022. The population in this study were toddlers who were stunted, a total sample of 70 respondents, with inclusion criteria: age 1-5 years, not having fish or meat food allergies, No under treatment, willing to follow the research to completion; Children with pulmonary tuberculosis, digestive disorders, and do not participate in the study until the end are exclusion criteria in this study. Sampling was done by purposive sampling.¹⁶

Making Chicken Floss and Catfish Nuggets

Chicken Floss

The ingredients for making chicken floss are 500gr chicken fillets, 200gr pumpkin, one teaspoon salt, three bay leaves, three lime leaves, one stalk lemongrass, three garlic cloves, five shallots, three candlenuts, one teaspoon coriander powder, one galangal segment crushed, one turmeric segment, one tablespoon brown sugar, 1/2 teaspoon sugar, 1-liter water, five tablespoons cooking oil for sauteing. How to make it: 1) Wash the chicken thoroughly and then boil it along with one bay leaf, one lime leaf, and lemon grass until the meat is tender and cooked; 2) Shredded the chicken until small size; 3) Make spices (Grind the garlic, shallots, candlenuts, cilantro, coriander, turmeric, and salt); 4) Grate the pumpkin then sprinkle with a teaspoon of salt, wash thoroughly then drain; 5) Sauté the spices, mix the bay leaves, lime leaves, galangal, brown sugar and stir until cooked; 6) Add shredded meat and bell peppers, and stir until dry and brown; 7) Drain with a spinner, ready to serve.

Catfish Nuggets

The ingredients for making catfish nuggets are 300 g of boneless catfish meat, nine slices of white bread, 300 ml milk, three eggs, three tablespoons of cornstarch, one teaspoon of ground pepper, three cloves of garlic, six tablespoons of red onion, 1/2 teaspoon salt, one teaspoon sugar, cooking oil to taste. How to make it: 1) Soak white

bread in milk for 10 minutes; 2) Grind the garlic and shallots, mix all the ingredients, stir, and pour into a baking dish greased; 3) Steam for 20 minutes; 4) Remove and let cool, then cut according to taste; 5) Dip the nuggets into the egg white and roll in the breadcrumbs; 6) Fry the nuggets in medium heat oil until golden yellow.

Hedonic Taste Acceptance Test

The hedonic test of taste was carried out on 30 consumer panelists, namely, stunting toddlers who were not the subject of the study. Panelists in this hedonic test have the same characteristics as research respondents. After the toddlers tasted the shredded chicken and catfish nuggets, the panelist parents were asked to ask the child for an assessment, and the panelist parents filled out the sheets provided. The acceptance ranges for shredded chicken and catfish nuggets were determined to Really like, more likes, like, somewhat like, standard, and do not like. The hedonic test data is divided into two categories: acceptable and unacceptable.

Experimental Procedure

The intervention was given by giving chicken floss and catfish nuggets for 14 consecutive days. Every day the respondents consumed four tablespoons of chicken floss (± 9 g per spoon) and five pieces of catfish nuggets (± 25 g per piece). Food recalls were carried out daily (for 14 days), ensuring adherence to chicken floss and catfish nuggets to avoid confounding factors.

Variables, Instruments, and Measurements

The variable that is measured is the change in stunting toddler's weight using a calibrated digital scale. The observation sheet is used to record body weight. Weighing was carried out 2 times (pre and post), namely on the first day before the intervention and the fourteenth day.

Data Analysis

The paired t-test was used to determine the effectiveness of supplementing on increasing body weight.

Ethical Consideration

This study is approved by the Ethics Commission of the Poltekkes of the Ministry of Health Semarang, with the number No. 0739/EA/KEPK/2022.

RESULTS

Figure 1 is an example of chicken floss and catfish nuggets. Each package of chicken floss weighs ± 252 g per pack. Each package of catfish nuggets contains ± 35 pieces of nuggets (± 25 g per piece) with a total weight of ± 875 g per pack. The results of the hedonic test of 30 panelists said that 27 (90%) panelists stated that they received chicken floss, and 28 (90.33%) panelists received catfish nuggets (Table 3).



Figure 1. Chicken Floss and Catfish Nuggets

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Table 1. Characteristics of Respondents (n=70)

Characteristics	Result
Sex	
Male	37 (52.8%)
Female	33 (47.2%)
Age	
1-2 years	13 (18.5%)
2-3 years	34 (48.6%)
3-5 years	23 (32.9%)
Height / Age	
Severely stunted	23 (32.9%)
Stunted	47 (67.1%)
Weight / Age	
Severely underweight	45 (64.3%)
Underweight	25 (35.7%)

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Table 2. Differences in Weight Change

Weight	Mean±SD (kg)	Mean diff	t	p-value
Before	10.25±1.729	0.534	14.567	0.0001
After	10.78±1.754			

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Table 1 shows that most of the respondents in this study were male (52.8%), with ages ranging from 1-5 years; all respondents were in the stunting and underweight category. Analysis results found that the average body weight before the intervention was 10.25 kg, and after the intervention was 10.78 kg ($p < 0.0001$). The average increase in body weight after giving shredded chicken and catfish nuggets for 14 days was 0.534 kg, which means that consumption of shredded chicken and catfish nuggets supplements can increase weight gain in stunted children (Table 2).

DISCUSSION

This study found that chicken floss and catfish nuggets effectively increased weight gain in stunted children, with an average increase of 0.534 kg. Every day the respondents consumed four tablespoons of chicken floss (± 9 g per spoon) and five pieces of catfish nuggets (± 25 g per piece) for 14 days. The results of the calculation of the nutritional contribution of nuggets with a serving size of 50 g to the

Recommended Dietary Allowances (RDA) for toddlers (1-5 years) have fulfilled 8% RDA of energy, 11.4% -12.7% RDA of fat, 22-27.6% RDA of protein, carbohydrates 4.6-4.7% AKG and 6.6-6.9% fiber. One serving of selected nuggets (50 g) contributes 8% energy, 11.4%-12.7% fat, 22-27.6% protein, 4.6-4.7% carbohydrates, and 6.6-6.9% fiber. The nutritional content of selected nuggets per serving size (50 g) is 114 kcal energy, 5.72 g fat, 5.51 g protein, 10.2 g carbohydrates, and 1.32 g fiber.¹⁷

Insufficient protein needs can cause weight gain. Good protein consumption can meet the needs of essential amino acids, namely amino acids that cannot be synthesized in the body and must be obtained from food. Animal protein has better quality than vegetable protein because the amino acids are complete.¹⁸ Fish contains various proteins, fats (omega three fatty acids), vitamins (vitamin A, vitamin D, vitamin B6, vitamin B12), and minerals (iron, iodine, selenium, zinc, and fluorine) needed by the body.¹⁹ One type of freshwater fish that is rich in benefits and easy to find in the environment is catfish.²⁰ Each part of the catfish contains nutrients that can be beneficial if consumed as the head of the catfish contains 50.94% protein, the meat contains 17.7%, and the fish bones contain a rich in calcium which is 39.24%.¹¹

In 100 g, catfish contains protein 20.0-46.6% (w/w), fat + 20.8 (w/w), minerals + 14.6% (w/w), water, and + 6.81% (w/w).²⁰ The catfish nugget in this study is a form of processed product made from catfish which is printed in the form of rectangular pieces and coated with seasoned flour, is ready to cook (ready to be cooked), and packaged in frozen form (stored in the freezer), without additives preservative. Catfish nuggets are a product that is seasoned and then covered with flour adhesive, breadcrumbed, and then fried.²¹ The catfish nuggets in this study are flat in shape. This attracts attention and tastes liked by children, so this product is popular to eat daily.

Based on the research results, consuming 50 g of catfish sausage and nuggets can improve the nutritional status of children under five.²² Freshwater fish is perfect for contributing to the development of the brain of toddlers and is safe for consumption. Catfish is the most widely consumed because it is easy to obtain and cheap.²³ The catfish nugget product can be used as an alternative high-protein snack for toddlers; the results of the nuggets acceptance test on 30 toddlers (1-5 years old) show 83.3% of subjects can accept the nuggets product well.¹⁷ The body needs proteins and amino acids to maintain cells and organs, especially in infants and children; protein and amino acids are helpful for growth and development.²⁴

Apart from being high in protein and calcium, catfish is rich in essential amino acids, which can function as a growth and development in the human body. Then, catfish have lower levels of mercury than mackerel and are, therefore,-

Table 3. Acceptance of Flavors (n=30)

Type	Accepted				Not Accepted	
	Really like	More likes	Like	Somewhat like	Standard	do not like
Chicken Floss	4 (13.3%)	6 (20%)	12 (40%)	2 (6.7%)	3 (10%)	3 (10%)
Catfish Nugget	3 (10%)	4 (13.3%)	17 (56.7%)	3 (10%)	1 (3.3%)	2 (6.7%)

suitable for nutritional fulfillment.²⁵ The advantage of catfish compared to other animal products is that it is rich in leucine, lysine, and omega-3 and omega-6 fatty acids. Leucine (C₆H₁₃NO₂) is an essential amino acid for children's growth and for maintaining nitrogen balance. Leucine is also helpful for the overhaul and formation of muscle protein. At the same time, lysine is one of the nine essential amino acids needed for growth and tissue repair. Lysine is an amino acid that is very important and is needed for the growth and development of children.²⁶

Chicken meat contains complete essential amino acids at once in quite a lot; namely, 2223 mg.²⁴ Protein is one of the macro-nutrients that functions as a building agent, maintains cells and tissues of the body and helps in the metabolism of a person's immune system. Protein derived from food will be digested and converted into amino acids that function as neurotransmitters precursors and play a role in developing the child's brain.² Protein has many functions in our body. Protein supports the existence of every body cell, the body's immune process. Protein is involved in the immune system as an antibody, a control system in the form of hormones, and nutrient transport.²³ Deficiency of amino acids can disrupt metabolism and primarily function as a precursor for essential hormones in the growth process (growth hormone, tyrosine, and adrenaline).²⁴ Fulfilling protein needs every day can increase stunting toddler weight gain.

CONCLUSIONS AND RECOMMENDATION

Providing supplementary food, chicken floss, and catfish nuggets can increase stunting toddler weight. Processed chicken floss and catfish nuggets can be used as an alternative for toddler food because they are relatively easy and inexpensive. Mothers who have stunted toddlers are expected to be able to meet their toddler's protein needs every day by providing chicken floss and catfish nuggets to increase stunted toddlers' weight.

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