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The potential of fish powder Seluang fish (R*asbora argytaenia*) as a source of protein in complementary feeding for toddlers

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Abstract

Background: Stunting increases at the age of 6 months where needed complementary feeding that fulfil energy and nutritional needs. By providing the right food, it will be able to prevent stunting or other nutritional deficiencies. One of the latest efforts that can be done to overcome stunting is the development of local food. Jambi has local food in protein sources, seluang fish ((*Rasbora argytaenia*), one of which is the material of fish powder. Objective: to examine the potential of fish powder seluang fish as an alternative protein source in complementary feeding for toddlers. **Methods:** Analysis of the protein content of fish powder seluang fish using Titrimetri methode. Then the data was analyzed descriptively. **Results:** the results showed that fish powder seluang fish contains 71.8% protein in 0.3 grams of sample. **Conclusion:** fish powder seluang fish has great potential as a raw material for complementary feeding as a source of protein for toddlers. It is hoped that the development of complementary feeding product based on seluang fish can increase protein intake and improve the nutritional status of toddlers, thereby reducing the incidence of stunting in toddlers.

Keywords: Seluang fish; toddlers; stunting; fish powder

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INTRODUCTION

Malnutrition is particularly prevalent in toddlers, necessitating serious attention. The short-term impact of malnutrition at this age group includes impaired brain development and physical growth, while the long-term impact can include a higher risk of non-communicable diseases in adulthood. Growth impairment due to malnutrition in childhood can lead to overweight and obesity in adulthood, with a greater risk of cardiovascular disease (1). There are many nutritional problems in Indonesia experienced by the toddler age group, one of which is stunting (2).

Based on Data Survei Status Gizi Indonesia (SSGI) 2022-2023, the prevalence of stunting in Jambi province reached 18% (3)(4). Data from the 2023 Indonesian Health Survey indicates that the prevalence of stunting in Jambi Province reached 13.5%. The target for stunting reduction by 2024 is 12% (3). Stunting is a chronic malnutrition or growth failure and used as an indicator of long-term malnutrition among children. Children who have moderately poor or nutritional status and short or very short stature are at risk of having a lower Intelligence Quotient (IQ) by 10-15 points. Many factors are associated with stunting in children, such as lack of energy and protein, chronic disease, feeding mistake, and poverty (5).

One of the factors that directly determines the nutritional status of infants and toddlers is inadequate nutrition that does not meet the amount and composition of the required nutrients, especially in the first 1000 days of life. A crucial period in the development of metabolism and cognition in infants occurs during the first 1,000 days of life. This period can be divided into three phases: pregnancy (9 months), exclusive breastfeeding (6 months), and complementary feeding (18 months). Good nutrition during pre-pregnancy, pregnancy, lactation, and complementary feeding is the main factor that determines the nutritional status of infants, which can be anticipated early by using resources and local wisdom (2)(6,7).

Protein requirements are closely related to stunting, so protein needs must be met starting with complementary feeding (MP-ASI) at 6-24 months of age. MP-ASI requirements for infants include high energy, protein, fat, vitamins, minerals, and other nutrients, and easy digestion. MP-ASI should meet infants' energy and protein needs with good nutritional quality. However, MP-ASI commonly consumed does not meet protein intake, especially from fish. One of the local fish typical of Jambi Province and abundant in existence is the seluang fish (Rasbora Argyroetania). This fish is rarely included in MP-ASI menus because it is processed only by frying and is consumed by children over 2 years of age. According to research by Soegandi et al. (2020), seluang fish has many nutritional contents, one of which is high in protein (8).

To prevent and reduce stunting, practical policies are needed, and this can be directly implemented through the involvement of mothers as gatekeepers regarding children's food intake. Given the high potential of seluang fish as a complementary food ingredient, practical processing innovations are needed to make it consumable and meet the nutritional needs of toddlers, one such approach is seluang fish powder. The content of these nutrients may differ between the regions of the origin of the fish. Therefore, we conducted a research on the potential of seluang fish with an effort to address the nutritional problems prevailing in Indonesia. This study aimed to determine whether seluang fish in Jambi can be a source of nutrition to prevent stunting, especially protein content.

METHODS

Study design and setting

This research is part of a research entitled identification of nutritional content and amino acid profile of seluang fish powder (*Rasbora Argytaenia*) as an alternative food source of protein for toddlers in Jambi City. This research is a quantitative descriptive study by testing the protein content of seluang fish powder. The study was conducted from May to October 2025 at the Laboratory of the Faculty of Animal Husbandry, Jambi University. This study used seluang fish as the main ingredient which was then processed into seluang fish powder. The material used were seluang fish, H_2SO_4, HCL, NaOH, distilled water, dan H_3BO_3. The tools used were oil paper, a dropper, volumetric flask 100 ml, destilation tools, dan erlenmeyer flask 250 ml.

Procedure and data collection

This research was conducted in two stages: fish powder production and protein titration testing. The fish powder production process began with fish processing in the Animal Husbandry Laboratory, using seluang fish obtained from the market as the main ingredient. The product was then dried at 55°C for 8 hours. This was due to the material's condition, which prevented it from being dried at 100°C for 2 hours, as it would damage the protein and amino acid content of the seluang fish (9). The dried fish is then ground into a fine powder.

The testing process was carried out by putting 0.3 grams of seluang fish powder sample into a 100 ml Kjeldhal flask. Then 2 grams of a mixture of selenium and 25 ml of concentrated H_2SO_4 were added, heated for 2 hours, then cooled, diluted and put into a 100 ml measuring flask to the line mark. 5 ml of the solution was taken and put into a distillation apparatus. Then 5 ml of 30 percent NaOH and a few drops of phenolphthalein indicator were added. Then distilled for ± 10 minutes. The distillate was added with 10 ml of 2 percent boric acid (H_3BO_3) solution, then titrated with 0.01 N HCl solution. The determination of protein content was repeated three times. Protein content was calculated using the following formula:

$$\text{protein content } (\%) = (Vp - Vb)xNx1.4007xFkWsplatauVspl \quad (1)$$

Vp = Volume of HCl required for sample titration (mL)
Vb = Volume of HCl required for blank titration (mL)
N = Normality of HCl(N) solution
Wspl = Test portion weighing weight (g)

*Ethical concideration*s

This research has received approval from the Health Research Ethics Commission of the Faculty of Medicine and Health Sciences, University of Jambi (No 3033/UN21.8/PT.01.04/2025).

RESULTS

The local food of the Jambi community is very diverse, providing opportunities for development to meet nutritional needs. Jambi has abundant marine resources, producing abundant fish as a source of protein. One type of fish that is quite widely produced and frequently consumed by the community is the seluang fish (Rasbora argyrotaenia). Seluang fish are larger than anchovies with a flat, oval body (https://tinyurl.com/ikanseluangdanbubuk). Seluang fish are a potential local food that can be developed due to their high nutritional value, which is useful for preventing

and addressing nutritional issues, particularly stunting (10). This is because previous research has found that seluang fish have the potential to address stunting (2,5,11,12). This fish is still processed into side dishes, typically fried, and consumed only by children and adults. However, other uses are currently unavailable.

The drying process and subsequent processing into fish powder (https://tinyurl.com/ikanseluangdanbubuk) increases the potential of this fish. This powdered form extends its shelf life. Given that this fish is endemic, there are times when it is unavailable or in short supply, making it an alternative food with improved nutritional quality. Furthermore, it can be used as a complementary food for infants. Furthermore, nutritional problems are common in infants, requiring nutrient-rich food sources such as seluang fish. Seluang fish powder exhibits excellent physical characteristics and nutritional value. A 0.3 g sample tested yielded 71.8% protein content. Converting this to grams of food yields 215.4 mg of protein. This high protein content indicates that seluang fish is a nutrient-dense food. Processing this fish into powder is expected to offer a practical alternative for use as a raw material for high-protein complementary feeding (MP-ASI).

DISCUSSION

The environment and type of food consumed by an organism significantly influence proximate content. This is what causes differences in proximate test results. The protein content produced is quite high compared to other types of seluang fish in Kalimantan waters. This protein content was 215.4 mg in Jambi waters, compared to 47.54 mg in Kalimantan waters (8). Compared to other local fish, seluang fish has a relatively high protein content. For example, anchovies (Stolephorus sp.) have around 67–70% protein, while catfish (*Clarias* sp.) have around 60–65% protein (13). Thus, seluang fish has great potential to become an alternative protein source for MPASI formulations.

Protein is a nutrient that acts as a regulator and builder. To address stunting, one of the key factors to consider is protein intake (1,14,15). The high protein content of this fish powder can increase the potential use of local foods to address stunting. Furthermore, it meets the Indonesian National Standard (SNI 2715-2013) as the highest quality for fish meal (16).

Fish powder has several advantages as a complementary food ingredient: it is easy to store, has a long shelf life, and is easy to mix into porridge or other complementary foods. Furthermore, seluang fish powder provides a source of protein, calcium, and essential micronutrients. The development of seluang fish-based complementary food products aligns with the government's efforts to promote local food-based nutritional interventions through the National Strategy for the Acceleration of Stunting Reduction (Stranas Stunting). Protein deficiency during infancy can inhibit linear growth and increase the risk of stunting. By adding seluang fish powder to complementary foods, it is hoped that children's protein needs can be met, thus supporting optimal muscle and bone growth. Furthermore, the use of local food ingredients supports food independence and sustainability, and involves community participation in efforts to improve nutrition.

CONCLUSIONS

Seluang fish (*Rasbora argytaenia*) has a very high protein content (71.8%) and has great potential as a basic ingredient for complementary feeding products. Utilizing seluang fish in complementary feeding can increase protein intake in toddlers and

contribute to reducing the prevalence of stunting. Further research is needed on the organoleptic properties, digestibility, and acceptability of seluang fish-based complementary feeding products in toddlers

CONFLICT OF INTEREST

The Author(s) declare(s) that there is no conflict of interest.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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