ANALYSIS OF CARBOHYDRATE AND PROTEIN CONTENT IN PROCESSED CLARIAS SP. AND MORINGA OLEIFERA AS AN EFFORTS TO PREVENT STUNTING

Nurul Fatmawati[1]*, Yesvi Zulfiana[2], Dian Soekmawaty Riezqy Ariendha[3]

[1,2,3] Midwifery Study Program Undergraduate Program INKES Yarsi Mataram
Correspondence : nfatmawati10@gmail.com

ABSTRAK : ANALISIS KANDUNGAN KARBOHIDRAT DAN PROTEIN PADA OLAHAN CLARIAS SP. DAN MORINGA OLEIFERA SEBAGAI UPAYA PENCEGAHAN STUNTING

Stunting merupakan salah satu masalah kesehatan yang serius di Indonesia dan masih ditemukan dengan prevalensi tinggi, yaitu 21,6% berdasarkan Survei Status Gizi Indonesi. Kondisi ini terjadi akibat kekurangan gizi kronis, terutama defisiensi protein, zat besi, zinc, vitamin A, serta senyawa bioaktif penting. Upaya pencegahan stunting melalui intervensi pangan berbasis sumber lokal menjadi strategi yang penting dikembangkan. Ikan lele (*Clarias sp.*) merupakan sumber protein hewani yang kaya asam amino esensial dan mineral, sedangkan daun kelor (*Moringa oleifera*) memiliki kandungan fitokimia dan mikronutrien yang tinggi.

Penelitian ini bertujuan untuk melakukan analisis kandungan karbohidrat dan protein kandungan gizi terhadap olahan nugget berbahan kombinasi *Clarias sp.* dan *Moringa oleifera* sebagai upaya pengembangan pangan fungsional untuk pencegahan stunting.

Penelitian ini menggunakan d esain deskriptif dengan pendekatan uji laboratorium. Analisis kandungan karbohidrat dilakukan menggunakan metode gravimetri, sedangkan uji kandungan gizi dilakukan di Laboratorium Kimia Analitik Universitas Mataram.

Hasil penelitian menunjukkan bahwa olahan nugget mengandung karbohidrat 2007,8 mg/100 g dan protein 12,35 mg/100 g.Kandungan protein menunjukkan kontribusi nutrisi dari ikan lele yang penting dalam mendukung pertumbuhan linier, perkembangan otak, dan sistem imun. Karbohidrat berperan sebagai sumber energi utama yang mendukung metabolisme dan pemanfaatan protein secara optimal.

Hasil penelitian ini menunjukkan bahwa kombinasi *Clarias sp.* dan *Moringa oleifera* dalam bentuk nugget memiliki potensi sebagai pangan fungsional bernilai gizi tinggi dan dapat dikembangkan sebagai salah satu alternatif intervensi pencegahan stunting berbasis pangan lokal.

Kata Kunci : *Clarias sp.*, *Moringa oleifera*, stunting

ABSTRACT

Stunting is a serious health problem in Indonesia and remains prevalent at 21.6% according to the Indonesian Nutritional Status Survey. This condition results from chronic malnutrition, particularly deficiencies in protein, iron, zinc, vitamin A, and essential bioactive compounds. Efforts to prevent stunting through locally sourced food interventions are an important strategy to develop. Catfish (Clarias sp.) is a source of animal protein rich in essential amino acids and minerals, while Moringa oleifera leaves are high in phytochemicals and micronutrients.

This study aims to analyze the carbohydrate and protein content of processed nuggets made from a combination of Clarias sp. and Moringa oleifera as an effort to develop functional foods for stunting prevention.

This study used a descriptive design with a laboratory test approach. Carbohydrate content analysis was carried out using the gravimetric method, while nutritional content testing was conducted at the Analytical Chemistry Laboratory of the University of Mataram.

The results showed that processed nuggets contained 2007.8 mg of carbohydrates/100 g and 12.35 mg of protein/100 g. Protein content shows the nutritional contribution of catfish which is important in supporting linear growth, brain development, and the immune system. Carbohydrates act as the main energy source that supports metabolism and optimal protein utilization.

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The results of this study indicate that the combination of Clarias sp. and Moringa oleifera in the form of nuggets has the potential as a functional food with high nutritional value and can be developed as an alternative intervention for stunting prevention based on local food.

Keywords: Clarias sp., Moringa oleifera, stunting

INTRODUCTION

Stunting is a serious public health problem in Indonesia, especially in children under five years of age. This condition is characterized by impaired linear growth due to chronic nutritional deficiencies, especially protein, iron, zinc, vitamin A, and other important bioactive compounds. (WHO, 2020) Based on the results of the Basic Health Research survey (RISKESDAS 2018), stunting cases nationally reached 30.8% of the total number of toddlers in Indonesia. The results of the 2022 Indonesian Nutrition Status Survey (SSGI) showed that the prevalence of stunting still reached 21.6%.

Stunting is a form of growth faltering due to the accumulation of long-term nutritional deficiencies from pregnancy to 24 months of age (Hoffman et al, 2000; Bloem et al, 2013). This condition is exacerbated by the lack of adequate catch-up growth (Kusharisupeni, 2002; Hoffman et al, 2000). The indicator used to identify stunted toddlers is based on the Height-for-Age (H/A) index according to the WHO child growth standard with stunting criteria if the H/A z score is <-2 Standard Deviation (SD) (Picauly & Toy, 2013; Mucha, 2013). The period of 0-24 months is a period that determines the quality of life, so it is called the golden period. This period is a sensitive period because the effects on babies during this period will be permanent and cannot be corrected. Therefore, adequate nutritional fulfillment is necessary at this age (Mucha, 2013).

So that local food-based nutritional interventions need to continue to be developed. Catfish (Clarias sp.) is a source of animal protein with complete essential amino acids and minerals such as zinc and iron.

Its use as a local food is readily available and economical, making it potentially suitable for development as a functional food ingredient to prevent stunting. Meanwhile, Moringa oleifera leaves are known to be high in nutrients and phytochemicals such as flavonoids, saponins, alkaloids, tannins, and essential vitamins (Gopalakrishnan et al., 2016). The combination of Clarias sp. and Moringa oleifera has the potential to become a functional food with high nutritional value.

However, information on the phytochemical content of processed combinations of these two ingredients is still limited. Therefore, this research is crucial as a first step in developing local food products with the potential to prevent stunting.

RESEARCH METHODS

This research is a descriptive study using a laboratory test approach. In this study, carbohydrate and protein content were analyzed using the gravimetric method. This study began with the production of moringa leaf catfish nuggets. The ingredients used in making the catfish and moringa leaf nuggets were catfish meat, moringa flour, wheat flour, eggs, garlic, shallots, pepper, salt, and breadcrumbs. Testing was conducted at the Analytical Chemistry Laboratory of the University of Mataram. The tools in checking the protein and carbohydrate content are analytical scales, drying ovens, desiccators, Kjeldahl apparatus (digestion unit, distillation unit, titration set), spectrophotometer (if the anthrone method), measuring flask, Erlenmeyer flask, burette and pipette.

The method used to determine protein content is kjeldahl, reagents for protein content analysis are 0.1 N HCl, 25 ml of distilled water, 15 ml of H_2SO_4, 50 ml of 40% NaOH, 7 grams of K_2SO_4, 0.8 grams of $CuSO_4$, 30 ml of 4% H_3BO_3, 3 drops of BCG-MR. Tools for protein content analysis include mortar, kjeldahl flask, destructor, Erlenmeyer flask, measuring cup, beaker, distillator, dropper pipette, analytical balance, biuret, volume pipette, rubber boult/pump, measuring flask, biuret. Checking the carbohydrate content using the Luff Schoorl method, with the reagents aquades, 5 ml HCl and 4 N, PP, NaOH, 10 ml filtrate, 25 ml Luffschrool, 26.5% H_2SO_4 and 20% KI; 5 ml. (Widarta et al., 2013).

RESEARCH RESULTS

Gynecology Test Results

Based on the table above, catfish and moringa leaf nuggets contain 2007.8g of carbohydrates/100g and 12.35g of protein/100g.

Table 1
Test Results for the Content of Catfish Nuggets and Moringa Leaves

Content	Test Results
Carbohydrate (mg/100g)	2002,4/100g
Proteins ((mg/100g	12,35/100gr

DISCUSSION

The results of the analysis of processed catfish (Clarias sp.) and moringa leaf (Moringa oleifera) nuggets showed the presence of carbohydrate and protein compounds as shown in Table 1. The protein content value was 12.35 mg/100g and carbohydrate 2002.4/100 g. This content indicates that the combination of animal and plant food ingredients has functional potential in supporting nutritional status and preventing stunting.

The protein content of 12.35 mg/100 g of the product demonstrates the primary nutritional contribution of catfish. Protein is an essential macronutrient required for linear growth, tissue repair, hormone formation, and brain development in children (Pratama, 2020; FAO, 2019). Catfish are known to have a complete amino acid profile, including lysine, methionine, and tryptophan, which are essential for growth hormone synthesis and bone mass (Suryani et al., 2023). Adequate protein intake is strongly correlated with a reduced risk of stunting, especially in children under two years of age (Sutanto et al., 2022).

Detected carbohydrates, even though their quantitative values are not listed, remain relevant as the primary energy source required by the body for metabolic functions and protein absorption (WHO, 2023). In supplemental food formulas, a balance between protein and carbohydrates is necessary to ensure optimal utilization of protein as a tissue builder, rather than as an energy source (Almatsier, 2019).

The combination of the nutritional potential of Clarias sp. and the phytochemicals of Moringa oleifera demonstrates that this product not only serves as a source of macronutrients but also serves as a functional food. Previous studies have shown that fish- and moringa-based food interventions can improve toddler nutritional status, hemoglobin levels, immunity, and cognitive development (Yuliana et al., 2021; Bello et al., 2022; Widyaningrum et al., 2022).

CONCLUSION

Thus, the results of this study strengthen the evidence that locally sourced food products, such as catfish nuggets and moringa leaves, can be developed as alternative interventions to prevent stunting. Their protein and bioactive compounds provide added functional value, supporting growth, metabolic health, and the immune system in children.

SUGGESTION

It is hoped that mothers who have toddlers can utilize local foods that are easy to obtain and process as an effort to prevent stunting.

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