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**Original Articles**

**THE POTENTIAL OF PATIN FISH (*Pangasius hypophthalmus*) PROTEIN CONCENTRATE IN ADDRESSING OF STUNTING**

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**ABSTRACT**

**Background:** Stunting has become a health problem in developing countries such as Indonesia. This can provide an effect on body composition, decreasing albumin levels and immunity status. *Patin* fish is well-known to have a high level of protein concentration and has a positive-effect on stunting.

**Objectives:** The present study aimed to investigate the nutrient compound of Patin fish protein concentrate.

**Methods:** The research method used is experimental laboratories. The test was carried out by Association of Official Agricultural Chemists method (AOAC) 2012.

**Results:** The results showed that Patin Fish Protein Concentrate have high protein contain. A comprehensive literature review was conducted to gather scientific evidence regarding the effects of height protein intake on improving nutritional status, linear growth, and health outcomes in children with stunting. The literature review findings indicate that Patin Fish protein concentrate holds promise as a good protein source in enhancing the nutritional status and growth of stunting children. Additionally, Patin Fish protein concentrate may provide supplementary benefits in increasing intake of omega-3 fatty acids crucial for brain development and cognitive function in children.

**Conclusion:** However, further experimental research is warranted to validate the findings of this literature review and assess the potential of Patin Fish protein concentrate in nutritional intervention programs for effectively addressing stunting.

**Keywords:** Stunting, Patin Fish Protein Concentrate, Protein Intake.

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**INTRODUCTION**

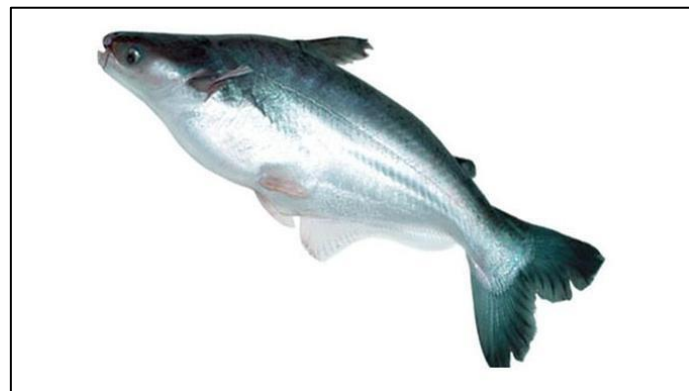
Undernutrition can result from an imbalance between needs and intake resulting in a lack of energy, protein, or micronutrients that can negatively affect growth, development, the immune system, and other outcomes (Gordon et al., 2012). The main causes of undernutrition are inadequate intake and infection (Gibson RS, 2005). Underweight, stunting, and wasting are indicators of undernutrition which are defined as anthropometric measurement results that are

below minus two standard deviations ( $<-2SD$ ) based on anthropometric standards for assessing children's nutritional status (UNICEF, 2013).

Children who are undernutrition have a reduced ability to fight infection, risk of morbidity and mortality, and a tendency to experience non-communicable diseases in adulthood when compared to children who have normal nutritional status, therefore intervention for undernutrition must begin as early as possible (Cederholm T, Jensen GL, 2017). Special attention to diet quality is essential during nutritional recovery, especially in the quality of protein intake, to allow for an increase in status without an excessive increase in energy intake (Martins VJB, Albuquerque MPD, Sawaya AL, 2017).

Fish is a source of protein. White fish (cod, hake, plaice) contain around 20% protein, 80% water, 0.5-3% oil, and small amounts of vitamins, minerals, carbohydrates and other substances. Oily fish (mackerel, herring, salmon) also contain about 20% protein, 62-70% water and 10-18% oil. Proteins in white and oily fish in digestion are broken down into polypeptides, peptides and amino acids and most of them have bioactive properties (Kundam et al., 2018).

Patin fish (*Pangasius hypophthalmus*) is one of the freshwater fish cultivated in Indonesia. Patin fish production from Indonesia is in the range of 100,120 tons/month. The average protein content of Patin fish fillets is  $17.79 \pm 0.20$  % (Nurilmala et al., 2015). Fish has many advantages compared to other animal products, namely abundant quantity, cheaper price, and easier to digest. Meanwhile, Patin fish has large, white flesh (Winarti S, 2010). The availability of Patin fish in Indonesia should be supported by its use and processing. One use of Patin fish is to process it into fish protein concentrate (FPC).



**Figure 1.** Patin fish (*Pangasius hypophthalmus*)

Fish protein concentrate (FPC) is a flour product for human consumption made from whole fish meat, by removing most of the fat and water content, so that the percentage of protein content obtained is higher than the original raw material (Charlotte & Marinho, 2018). In addition, FPC can be stored for a long time at room temperature without experiencing many changes (Dewita, Syahrul, 2015).

Using KPI as a food supplement can play a role in increasing immunity, because fish protein is rich in bioactive peptides. Peptides are proteins with a relatively small molecular size generally containing 2-20 amino acid units in a chain so they are more easily absorbed through the intestines and enter the circulatory system so they have physiological effects

(Robert A. Saxton and David M. Sabatini, 2017). The aim of this study was to determine the content of Patin fish (*Pangasius hypophthalmus*) protein concentrate.

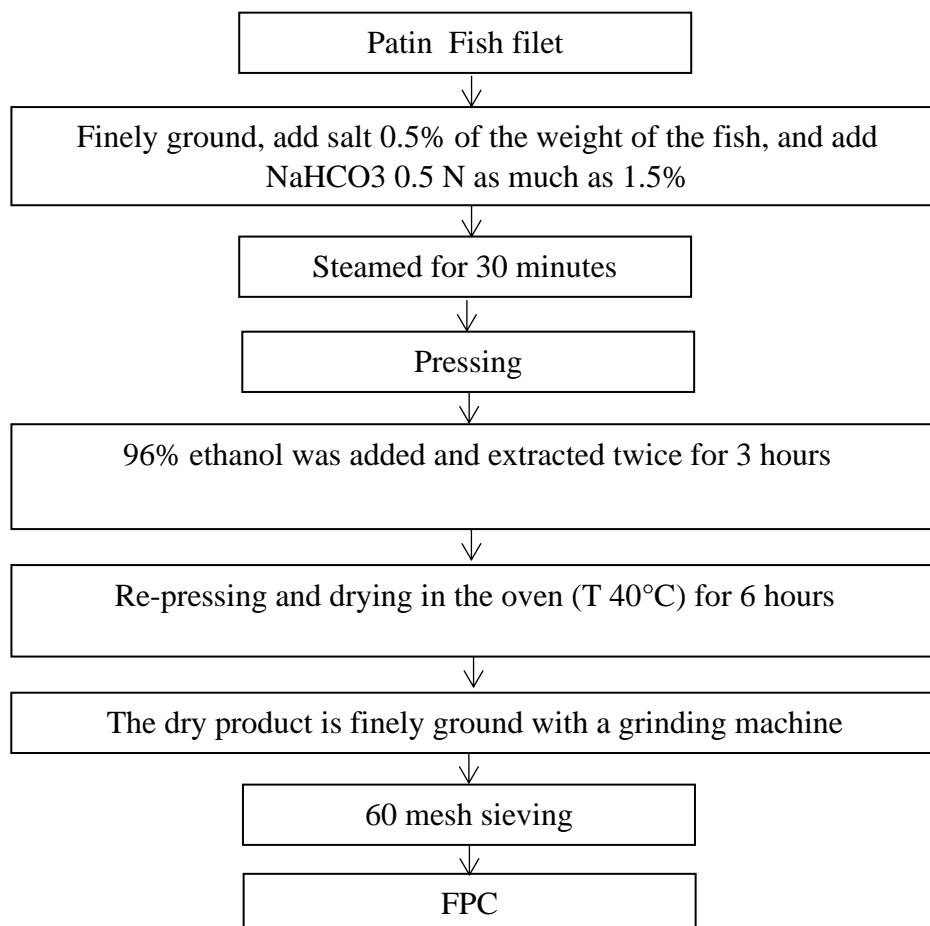
## METHODS

### *Methodology*

The newly harvested Patin fish (*Pangasius hypophthalmus*) is put into a cooling box with ice cubes to maintain the freshness of the Patin fish (*Pangasius hypophthalmus*) during the transportation process from the pond to the laboratory. The fish is cleaned and filleted to separate the bones and rinsed under running water to separate the dirt. Fish fillet meat is stored using polyethylene (PE) plastic which is then frozen at  $-18^{\circ}\text{C}$  until the FPC manufacturing process.

### *FPC Processing*

The flow for making Patin (*Pangasius hypophthalmus*) Fish Protein Concentrate is as follows:



### *Proximat test of Patin (Pangasius Hypophthalmus) Fish Protein Concentrate*

Proximate analysis of Patin (*Pangasius, hypophthalmus*) fish protein concentrate was carried out using the Association of Official Agricultural Chemists (AOAC) 2012 method. Proximate analysis carried out was water, protein, ash, fat and carbohydrate content. by difference.

### Setting

The study was carried out at laboratory Fishery Products Technology Diponegoro University Semarang to Patin Fish Protein Concentrate processing and analysis.

### Materials

Patin fish (*Pangasius hypophthalmus*), etanol 96 % (food grade), Salt, dan  $\text{NaHCO}_3$  0,5 N.

### Ethical Consideration

This research project was conducted in 2020. This study was approved by the Health Research Ethics Commission, Diponegoro University Semarang No. 130/EC/KEPK/FK-UNDIP/X/2019.

## RESULTS AND DISCUSSION

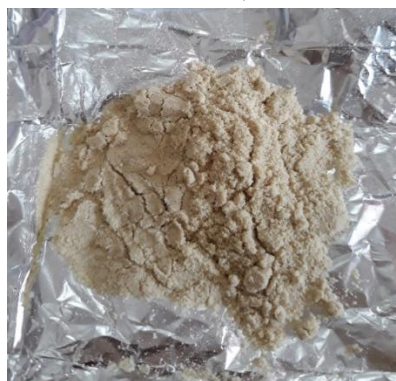
### *Proximate analysis of Patin (Pangasius, hypophthalmus) fish protein concentrate*

The results of the proximate analysis of FPC Patin are as follows:

**Table 1.** Result of FPC Patin proximate analysis

No	Analysis	%
1	Water content	7,23±0,35
2	Ash content	2,77±0,78
3	Protein	81,06±0,55
4	Fat	4,07±0,18
5	Carbohydrate	4,85±0,30

The table above shows that the protein content of Patin (*Pangasius hypophthalmus*) FPC in this study is higher than the protein content of Gabus FPC (*Channa Striatus*) from previous research, namely 76.13% (Asfar M, Tawali AB, Abdullah N, Mahendradatta M, 2014), the protein in the FPC in this study is in the ideal FPC range, besides that the protein content of  $81.06 \pm 0.55$  for the FPC used in this study is higher than the average protein content of several FPC produced from previous catch fish species, namely 57-79% (Tawali et al., 2018). The water content of Patin FPC in the research meets the Indonesian National Quality Standard No.01-2175-1992 where the optimum water content for fish meal is 6-10%, this water content will reduce the possibility of damage during storage. The water content of fish meal can be used as a standard for the water content of Patin FPC considering that these two products are processed fish products (Dewan Standarisasi Nasional, 1992).



**Figure 2.** Patin fish (*Pangasius hypophthalmus*) Protein Concentrate

Fish protein is one of the easily digestible proteins and has functional properties for the body. Concentrating fish protein can cause fish protein to have physicochemical properties and biological activities that are beneficial for the body, one of which is the peptide molecular weight which separates peptides with the desired functional properties for use as bioactive ingredients. Bioactive peptides exert different physiological effects in the human body, including antihypertensive, antioxidant, immunomodulatory, anticancer, antithrombotic, and antimicrobial activities (Adilla SN, Utami R, Nursiwi A, Nurhartadi E, 2017).

Patin Fish contains 17% protein, 110 mg/kg calcium, 5.3 mg/kg zinc, and 11.2 mg/kg iron (Islam R, Paul DK, Rahman A, Parvin T, Islam D, Sattar A, 2012). Steamed Patin Fish (*Pangasius hypophthalmus*) fillets have a higher protein content compared to fresh Patin Fish (*Pangasius hypophthalmus*) fillets (Pratama RI, Rostini I, Rochima E, 2018). Patin fish has a higher protein content when compared to other types of fish such as: Snakehead (*Channa striata*) 16.2%, Goldfish (*Cyprinus carpio*) 16.0%, Sepat (*Trichogaster trichopterus*) 15.2%, Baung (*Mystus*) 15.1%, Belida (*Chitala*) 14.7%, Belut (*Monopterus albus*) 14.6%, Baronang (*Siganus Sp.*) 14.5%, Tongkol (*Euthynnus affinis*) 13.7%, and Teri (*Engraulidae*) 10.3%. (Mustafa et al., 2012)

The high protein content in Patin FPC allows Patin FPC to be used as a food ingredient in the management of Undernutrition problems in children, especially stunting, where increasing the availability of protein intake from Patin FPC allows amino acid oxidation, so that fatty acid oxidation is limited, which will allow fat accumulation, increase body weight and growth. Sustained increases in protein intake will promote progressive increases in insulin and insulin growth factor-1 (IGF-1), and reduce the catabolism of cortisol-bound proteins and allow muscle protein replenishment. (Bartz S, Mody A, Hornik C, Bain J, Muehlbauer M, Kiyimba T, et al, 2014).

Adequate protein intake is essential to support linear growth and overall nutritional status, making it a key factor in preventing and treating stunting (Salva et al., 2012). Protein is necessary for the synthesis of tissues, hormones, enzymes, and components of the immune system, all of which play important roles in growth and development during childhood. Lack of protein intake can inhibit the body's ability to build and repair tissue, resulting in stunted growth and development (Hunsley B, Scholl JW, 2019). In addition, protein deficiency can exacerbate the effects of other nutritional deficiencies commonly associated with stunting, such as micronutrient deficiencies. Therefore, ensuring adequate protein intake, especially from high-quality sources, is critical to combat stunting and promote optimal growth and development in children. Interventions aimed at increasing protein intake, whether through dietary diversification, supplementation, or fortification, can make a significant contribution to efforts to combat stunting and its associated health consequences (Kozak & Krośniak, 2019).

## CONCLUSION

Patin Fish (*Pangasius hypophthalmus*) Protein Concentrate has a high protein content, namely  $81.06 \pm 0.55$ , this allows Patin (*Pangasius hypophthalmus*) FPC to be used as a supplement in the management of undernutrition in children, especially stunting.

## SUGGESTION

It is hoped that Patin FPC can be used as a food ingredient that helps manage undernutrition in children in the long term with subsequent clinical trials and it is recommended to carry out protein digestibility tests in vitro to ensure the amount of amino acids that can be absorbed and used by the body.

## LIMITATION

There are no limitations in carrying out this research.

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