# Dewi 3

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# Profile Albumin and Protein Filtrate of Snakehead Fish

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**ABSTRACT**

Background and Objective: Snakehead fish in South Kalimantan waters is the most common type of fish. The utilization is still limited. In general, snakehead fish is for consumption, so it need an effort of diversification of processed fishery products. The aims of this research were: (1) increasing value-added of snakehead fish of processing functional filtrate albumin, (2) determining the best steaming duration toward albumin level and filtrate protein of snakehead fish. Materials and Methods: Ingredients used this albumin filtrate were fresh snakehead fishes and ginger or turmeric. This research used random design completed with a factor which was steaming duration of snakehead fish albumin filtrate of 30, 60, 90 and 120 minutes. Results: The result of the research showed that the different steaming duration had significant effect toward protein content, but it had no significant effect toward filtrate albumin of snakehead fish. Conclusion: It can be concluded that the making of snakehead fish filtrate with steaming duration of 90 minutes obtained the highest albumin and protein content.

**Keywords:** Abumin, Filtrate, Protein, Snakehead Fish

## 1. Introduction

Snakehead fish (Ophiocephalus striatus) in South Kalimantan waters is the most common type of fish. The utilization of snakehead is still limited. It is generally as fish for consumption, so it needs effort of processed fishery products. snakehead fish is one of source of animal protein. Animal protein is referred to as complete and high-quality protein because it has essential amino acid content, and the structure almost meets amino acid needed by the body as well as it has high digestibility (Muchtadi, 2010). Protein content of snakehead fish is 25.5% and it is higher than sardine (21.1%), milkfish (20.0%), Snapper (20,0%), catfish (17.71%), goldfish (16.0%) (Nurilmala, 2009).

High albumin content in snakehead fish (Tawali, 2021) and evidence of efficacy in clinical test on the healing process of postoperative patients (Taslim, 2004; (Haniffa et al., 2014) and patients burns (Midu et al., 2012) and the high cost of commercial albumin preparations, making snakehead fish an alternative as an inexpensive source of albumin.

Efficacy of giving additional functional biscuits fortified by Zn and Fe for snakehead fish can increase hemoglobin, ferritin, zinc, albumin and immunoglobulin G levels for children (Sari et al., 2014). The best quality of organoleptic characteristics of instant baby porridge formula is substitution of snakehead fish meal (15%) and pumpkin flour (10%) (Sari, 2017). The functional food consists of active component which can give benefit for health, aside from benefits given by its nutrients. High protein food product, albumin and amino acid is a functional food which can be choice to overcome nutrient problems in the future, such as food that can increase body immunity (Astawan et al., 2012).

Snakehead fish contains high protein, especially albumin and essential amino acids, fats especially essential fatty acids, minerals especially zinc Zn and some vitamins which are very good for health (Mustafa et al., 2012). The nutritional content of snakehead fish is 13.61% water, 5.96% ash, 76.9% protein, 1.70% fat, 3.53% carbohydrates, 3.09 mg Zn and 4.43 mg Fe (Shafri & Abdul Manan, 2012). Snakehead fish contains bioactive compounds that accelerate wound healing such as amino acids (glycine), the mineral zinc (Zn), and unsaturated fatty acids such as omega-3, omega-6 and omega-9 (Tungadi, 2019; Wooster et al., 2018). This fish meat is known to have biological properties for the human body (Permatasari et al., 2021). Snakehead fish meat extract contains amino acids and fatty acids which are important in the synthesis of collagen fibers, especially glycine which plays a role in the wound healing process. The results of research by (Aisyatussoffi & Abdulgani, 2013) showed that 0.15 ml/day of snakehead fish extract therapy could regenerate pancreatic islets of Langerhans tissue by 68.78% and reduce blood glucose levels by 34.42% for 14 days.

Albumin filtrate of snakehead fish as functional food can be implemented into food product, as food supplement with functional properties which are high albumin and protein content. Filtrate of snakehead fish is fluid from extraction of snakehead fish meat. Basic principle of making albumin filtrate of snakehead fish is plasma protein extraction of snakehead fish. Temperature and process mechanism of fish meat extraction to obtain albumin filtrate must be considered well because albumin is protein that is protein is susceptible to heat. Steaming method in processing simple albumin filtrate is simple and easy to adopt. Steaming duration of fish meat extraction process will affect albumin quality. This research aims to determine the best steaming duration of snakehead fish toward albumin profile and filtrate protein of snakehead fish.

## 2. Materials and Methods

The main materials used in making albumin filtrate were fresh snakehead fishes and ginger or turmeric. Instruments to analyze samples consisted of digital scales, kjeldahl apparatus and spectrophotometers.

Kjeldahl method is a simple method to determine total nitrogen of amino acid, protein, and nitrogenous compounds. Samples were conducted destruction by sulfuric acid and catalyzed by appropriate catalyst, so it would generate ammonium sulfate. After the release with strong alkali, formed ammonia was distilled steam quantitatively in absorbent solution and determined by titration (AOAC, 1995).

Albumin level test used spectrophotometer in a way that snakehead fishes were cleaned, filleted and mashed up, preparing albumin standard approximately 300µ g/ml, preparing protein solution in test tube so it would show the grade from 30-300µ g/ml, adding into each tube 8 ml Reagen Lowry A, shacked and left for 20 munites and reading OD (absorbent) wavelength of 600 nm with spectrophotometer (Sudarmadji & Haryono, 2002).

The steps in making albumin filtrate of snakehead fish as follow:

1. Cleaning and weeding the fishes (scales, stomach contents, gills, fins, and head removal), washing with water flow, and adding the water with lime and left ± 10 minutes. Furthermore, fishes were rewashed so there was no blood and mucus in fish meat.
2. Steaming the fishes in temperature of 50oC using 2 pans, which were big pan for steaming process and small one to put the fishes.
3. Adding water approximately ±10 ml into small pan which would be steamed. Snakehead fish steaming process used steaming duration of 30, 60,90 and 120 minutes. After steaming process, small pan would obtain broth/liquid/filtrate of snakehead fishes (I)
4. Fish meat which had been steamed was pressed using filter cloth, so it was obtained broth / liquid/filtrate of snakehead fishes (II).
5. Filtrate mixture of snakehead fish I and II, then were conducted measurement of obtained filtrate volume of snakehead fish, to reduce fishy smell in filtrate, it could be added grated ginger or turmeric water.
6. Albumin filtrate of snakehead fish was ready to consume or enter into closed glass bottle and stored in freezer.
7. Albumin filtrate had been stored in freezer (max 2 days), before consuming, open the the bottle cap and left in room temperature until it melted.

Data was analyzed by variance analysis (Anova) with degree of trust 95%. If it was shown significant effect to find out the difference between the treatment, it continued with BNJ (different honest value).

## 3. Results and Discussion

*Albumin*

Figure 1 shows mean value of highest snakehead fish filtrate albumin in 90 minutes of steaming is 9.09% and the lowest steaming of 30 minutes is 7.84%.

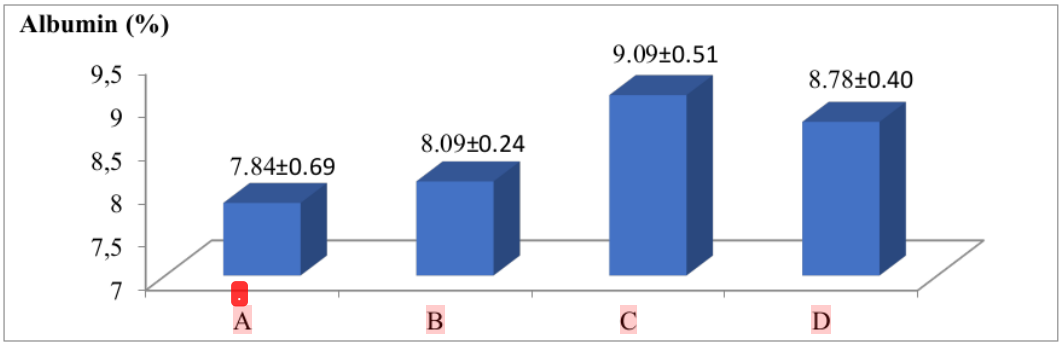


Fig. 1: Mean Values of Snakehead Fish Filtrate Albumin

The result of Anova analysis showed that Fcount (2.85) < Ftable 5% (6.59) and 1% (16.69. it meant that the difference of steaming duration and snakehead fish meat did not affect significantly toward albumin level of snakehead fish filtrate because steaming temperature was only 50oC. Albumin had property which could be coagulated by heating. The range of temperature while there were denaturation and coagulation of most proteins were approximately 55oC-75oC. If globural protein had denaturation, there was no covalent bonds in damaged polypeptide chains. However, in biological activity, almost all protein was damage, so it caused the decrease of solubility (DeMan, 1999). Revealed that heating albumin in temperature of < 50oC did not decrease solubility. The albumin solubility would decrease in temperature approximately 50-70oC marked with the form of gel. Solubility decreased significantly in temperature of 70-80oC marked with formed geal albumin strongly (Foegeding et al., 1986). Applying the right temperature can increase the yield and quality of fish extracts, because heating will affect the permeability of the cell walls so that the process of removing plasma from tissues can be faster. Applications that are too high can coagulate plasma proteins. Coagulated plasma proteins will attach to myofibrillar proteins (meat threads). Applying the optimal temperature and time for the extraction process of 70-800C for 30-60 minutes gives good results of fish extract (albumin filtrate) (Santoso, 2001).

*Protein*

The nutritional value of protein can be interpreted as the ability of a protein to be utilized by the body as a source of nitrogen for the body's protein synthesis. There are two factors that determine the nutritional value of a protein, namely: (1) its digestibility or digestibility and (2) it's essential amino acid content. Proteins that are easily digested (hydrolyzed) by digestive enzymes and contain complete and balanced amounts of essential amino acids are proteins of high nutritional value (Muchtadi, 2010). Figure 2 shows mean value of highest protein level of snakehead fish filtrate in steaming duration of 90 minutes was 7.59% and the lowest steaming duration of 30 minutes was 5.50%.

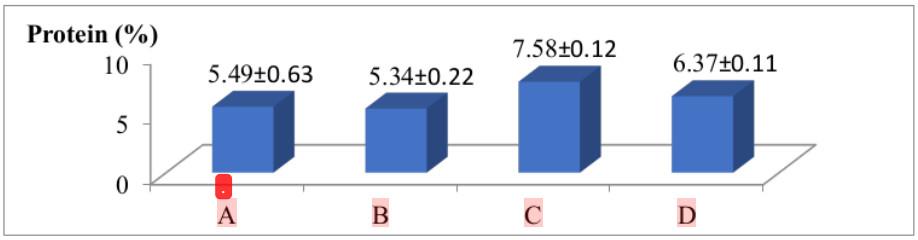

Fig. 2: Mean Values of Snakehead Fish Filtrate Protein

The result of anova analysis showed that Fcount (18.03) < F table 5% (6,59) and 1% (16.69). it meant the different steaming duration of snakehead fish meat affected significantly toward protein level of snakehead fish filtrate.

In general, protein solubility increased in temperature of 0-40oC, but the temperature above 40oC contained protein which was unstable, and it was marked changes in physical properties of proteins. Physical properties affected significantly toward protein functional nature because it affected protein interaction with water solvent and ability to bind water of meat (Wirahadikusumah, 1981);Nakai, 1996). Protein of fish meat was unstable, and it had property that could change along with the change of environment circumstance (Pavlov et al., 2008). Protein level in either wet basis or dry basis could change depend on species type and process method (Erkan et al., 2010)

## 4. Conclusions

Different steaming duration affects significantly toward protein level, but it does not affect albumin level of snakehead fish filtrate. Albumin filtrate of snakehead fish with steaming duration of 90 minutes was obtained mean albumin level and the highest protein.

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