Albumin profile of snakehead fish (*Channastriata*) from East Kalimantan, Indonesia

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Abstract. This study aimed to determine the properties of albumin of snakehead fish (*Channa*strata) by various method extraction. The extraction of snakehead fish albumin was done using water (W), NaCl 0,9% (N), HCl 0.1 M (H). This research used three groups weight of snakehead that were 300-600 g (small; S), 600-900 g (medium; M) and 900-1200 g (large; L). Raw materials (snakehead fish) obtained from Middle Mahakam area, East Kalimantan, Indonesia. The parameters of this research were yield, proximate, albumin, and colour. The data were analyzed by using completely randomized design which consist two factors of treatments (solvent and weight of snakehead) and three replications.

1. Introduction

Snakehead fish (*Channa strata*) is one of the local fish in East Kalimantan, especially in Middle Mahakam area. The local name of snakehead fish is known as haruan, ruan or gabus. This fish has a high economic value due to its high content of albumin [1]. Albumin is kind of globular protein dissolving in water, salt, acidand could be coagulated by heat [2, 3].

Albumin is very important for human body needed, especially for the healing of wounds [4]. Protein from snakehead fish enhances dermal wound healing and reduces post-operative pain and discomfort. In addition, the amino acid composition of snakehead fish was reported to play a role in the process of wound healing [5].

The quality of albumin depend on the method was used during extraction. In addition, the weight of fish have the difference nutrition content also effect to albumin quality. The objective of this research was to evaluate the properties of albumin extracted by various solvent and the difference of fish weight from Middle Mahakam area, East Kalimantan. The properties of albumin in this study included yield, proximate composition, amino acid composition and lightness of snakehead protein extracted.

2. Method

2.1. Sample preparation

Raw materials used in this research were snakehead fish obtained from Middle Mahakam area, East Kalimantan, Indonesia. The other materials were used in this research include NaCl,HCl, clean water and distilled water. The fish was remove the scales, gills, and stomach content. Fish was washed until there was no blood and mucus and then was filleted. The fillet was cut into small pieces and was blend using solvent appropriated the experimental design. The ratio solvent and flesh was 1:1 and then was heated using waterbath at the temperature of 60^{o}C for 15 minutes. After that, the samples were filtered

to separate filtrate and substrate. Then, the filtrate was dried by oven at the temperature of 55^{o}C for about 48 hours. The dry extracted was grinded and sieved using 60 mesh. The albumin powder was analyzed consist of yield, chemical composition, lightness, amino acid and albumin content.

2.2. Statistical Analysis

Data analysis was applied using completely randomized design consist of nine treatments with three replications using analysis of variance following by Tukey test at $\alpha = 0.05$. The sample code used in this study were SW (small fish with water solvent), MW (medium fish with water solvent), LW (large fish with water solvent), SN (small fish with NaCl solvent), MN (medium fish with NaCl solvent), LN (large fish with NaCl solvent), SH (small fish with HCl solvent), MH (medium fish with HCl solvent) and LH (large fish with NaCl solvent).

3. Result and discussion

3.1. Yield and chemical composition

Table 1 shows the chemical composition of albumin extract. The yield of samples ranged between 2.31% and 3.58%., average being 2.89%. Snake head fish protein concentrate which was made using distilled water solvent had high water content among the other concentrated produced from other solvents, thereby affecting the mass of the product. The amount of yield of the products can be known from the moisture content of the product. The higher the moisture content of a product, the higher the yield produced, because high water levels resulted in increased product mass [6].

Proximate analysis showed that the lowest moisture and ash content obtained from treatment LW that were 9.63% and 16.91%, respectively. Treatment LW also gave the highest protein and the lowest fat content that were 67.67% and 0.75% respectively. While the lightness, all treatment of the the samples ranged from 74.57 to 83.21, average being 80.31.

Table 1. Chemical composition of snakehead albumin extract.

Samples	Yield (%)	Moisture (%)	Ash (%)	Protein (%)	Fat (%)	Lightness
SW	2.56	12.16	16.91	63.79	1.74	80.00
SN	3.29	12.53	23.01	56.92	1.86	81.04
SH	2.93	12.18	21.93	59.24	1.20	81.10
MW	2.31	11.04	18.29	65.22	1.29	79.11
MN	3.35	11.19	22.69	60.21	1.42	82.55
MH	2.50	11.64	22.34	63.33	2.16	83.21
LW	2.89	9.63	18.02	67.67	0.75	74.57
LN	3.58	12.94	21.55	57.38	1.61	80.57
LH	2.64	12.48	21.83	63.59	1.44	80.68

High or low value of protein content can also be influenced by the amount of moisture loss (dehydration) of the material. Protein content will be even greater if the amount of water loss increases. The protein content depends on the amount of ingredients added and is largely influenced by moisture content [7]. Moreover, protein content of the fish is affected by moisture, where there is an inverse relationship between protein and water content, in which the higher the protein content increases as the water content decreases [8].

Low fat content is one of theindicator of the quality of good fish protein concentrate, because the high fat content also affected the process of rancidity in product [9]. Rancidity occurs when components of taste and smell of volatile formed as a result of oxidative damage of unsaturated fats and oils. These components caused the smell and taste of unwanted fat and oil and products containing fats and oils [8]. Low level of fat in the snakehead fish protein concentrate is also influenced by the process of meat cutting which can help releasing fat and water because it can increase the surface area

in contact with hot material upon heating. Downsize will facilitate the penetration of moisture and hot air in the cells containing fat. The smaller the surface area formed as a result of cuts, the greater the contact material with the heat, causing the composition of fatty damaged impact on the levels of fat [10].

The result showed that the highest yield was obtained using salt solvent. While the lowest yield was generated by using water. The acid solvent resulted the extract more lightness. While the water solvent gave lower L value.

3.2. Amino acid composition

The profile of amino acid of snakehead albumin obtained is shown in Table 2. The table shows that the highest of total amino acid was generated by water solvent on medium size (fish weight 600-900 g). As a whole, the highest components of amino acid are aspartic acid, glutamic acid, lysine and leucine. Leucine is one of the components absolutely needed for children growth as a brain function trigger, prevents muscular degradation and play a role in the wound healing process [11].

Table 2. Amino acid profile of snakehead albumin extract (the values represented in percentage; %).

Amino Acid	**Solvent**								
	Water			**NaCl 0.9%**			**HCl 0.1 M**		
	S	M	L	S	M	L	S	M	L
Aspartic acid	5.51	7.44	7.43	5.74	6.17	6.43	5.26	5.42	5.52
Glutamic acid	4.60	6.86	6.51	5.50	5.66	5.87	4.41	4.53	4.92
Serine	1.58	2.16	2.36	1.48	1.80	2.11	1.47	1.40	1.78
Histidine	0.67	1.37	1.35	0.07	1.06	1.09	0.74	0.73	0.85
Glycine	3.66	3.31	3.09	2.57	2.74	2.75	3.69	3.75	3.72
Threonine	1.56	2.19	2.22	1.11	2.07	1.94	1.64	1.60	1.77
Arginine	1.64	2.83	2.77	2.15	2.30	2.43	1.52	1.52	1.80
Alanine	3.43	4.22	4.05	3.58	3.54	3.65	3.40	3.41	3.64
Tyrosine	0.94	1.39	1.67	1.46	1.48	1.27	0.79	0.64	0.80
Methionine	0.90	1.10	1.37	1.01	1.42	0.92	0.62	0.59	0.74
Valine	1.85	3.22	3.06	2.11	2.50	2.59	1.76	1.83	1.84
Phenylalanine	3.36	4.10	4.11	2.70	3.57	3.62	3.22	3.37	3.29
I-leucine	1.93	3.21	2.92	2.01	2.65	2.56	1.86	2.08	1.92
Leucine	3.38	4.98	5.00	4.24	4.10	4.28	3.14	3.28	3.27
Lysine	4.35	5.89	5.52	3.67	5.32	4.75	4.84	4.69	4.37
Amino Acid Total	39.37	54.25	53.43	39.41	46.39	46.23	38.36	38.83	40.21

3.3. Albumin content

Result of soluble protein (albumin) content of snakehead fish range from 13.95 % to 19.61 %. Figure 1 shows that albumin or dissolved protein in the snakehead fish could be soluble amongst all of solvent. Solubility of albumin in water shows that the albumin is polar.In addition, to dissolve a compound that was polar, the polar solvent must be used.In this case, this research used distilled water, 0.1 M of HCl and 0.9 % of NaCl were the polar solvent [13].

Level increase of soluble protein after treatment was due to hydrolysis of the soluble protein in the fish. Hydrolysis of proteins is the process of the breakup or breakdown of peptide bonds of proteins into simpler molecules with solvents assistance. Hydrolysis of peptide bonds will cause some changes in the protein, which increases the solubility due to the increase in the ion content of the amine (NH_3^+) ions and carboxyl (COO^-), thus, results in lower molecular weight proteins or polypeptides as well as unraveling the structure of globular proteins [13]**.**

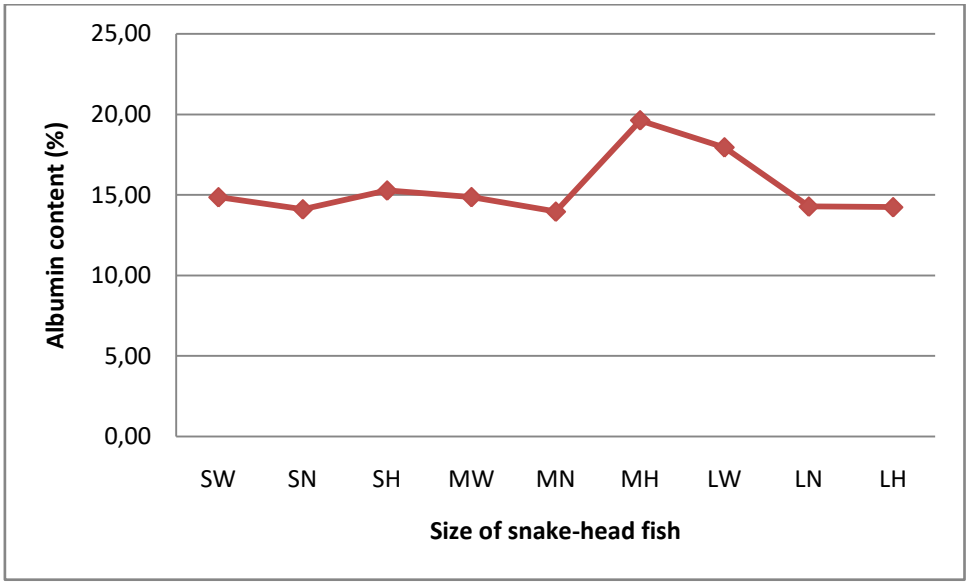

Figure 1. Albumin content of snake-head fish extract on various solvent(SW:small fish with water solvent, MW: medium fish with water solvent, LW: large fish with water solvent, SN: small fish with NaCl solvent, MN: medium fish with NaCl solvent, LN: large fish with NaCl solvent, SH: small fish with HCl solvent, MH: medium fish with HCl solvent and LH: large fish with NaCl solvent).

4. Conclusion

As a conclusion, salt solvent was the best treatment to resulted albumin extract based on yield and lightness. While the highest albumin content obtained from acid solvent (HCl 0,1 M) at medium size of fish (600-900 g).

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