The Effect of Addition of Arabic Gum to Amino Acid Profile and Fatty Acid Profile of Albumin Powder Cork Fisk (*Channa striata*)

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DOI: 10.29322/IJSRP.9.05.2019.p8979
http://dx.doi.org/10.29322/IJSRP.9.05.2019.p8979

Abstract

Albumin is one of the most abundant proteins in plasma, accounting for around 50-60% of serum protein and 3% of the body's total protein. Albumin is a relatively small molecule with a molecular weight of approximately 66,500 Da, and consists of 585 amino acids which are arranged into three repetitive homologous domains and two subdomains. Cork fish albumin extract is usually consumed in liquid form and smells fishy so that not everyone likes it. For this reason, another alternative is needed, namely by processing using a drying method so that it produces albumin in powder form which is expected to be accepted by everyone. This study aims to determine the effect of the addition of Arabic gum on the type and amount of amino acids and fatty acids of cork fish albumin powder. The chemical composition of cork fish albumin powder was tested by proximate analysis. Amino acid content in cork fish albumin powder can be tested using HPLC (High Performanced Liquid Chromatografy), while the fatty acid content can be tested using GC-MS (Gas Chromathography Mass Spectrometer). Albumin powder in the treatment of addition of 100% maltodekstrin and 0% Arabic gum was obtained albumin levels of 1,98%, protein 21,33%, water 6,06%. The highest amino acid content of glutamic acid is 0,40%, phenylalanine acid 0,40%, and lysine acid 0,36%, and the highest fatty acid content is Palmitic acid 23,46% and Oleic Acid 15,82%.

Keywords: Albumin powder, amino acids, fatty acids, maltodextrin, Arabic gum.

I. INTRODUCTION

Cork Fish (*Channa striata*) is an important freshwater consumption fish in many regions of Southeast Asia including India. This species has a vast natural distribution, stretching from Iran to the Middle East including India, China and Indonesia. In India and other Southeast Asian countries, Cork Fish (*Channa striata*) is an important component of freshwater fish catches and produces relatively high prices compared to carp (Sood et al., 2011). Cork fish albumin extract is usually consumed in liquid form and smells fishy so that not everyone likes it. For this reason, another alternative is needed, namely by processing using a drying method so that it produces albumin in powder form which is expected to be accepted by everyone. In the drying process, coating agents are needed, namely arabic gum. According to Rahmanto et al. (2014). The addition of arabic gum as a binder is expected to improve the quality and improve the shelf life of the final product. Gum arabic is a hydrocolloid that dissolves easily in water. Emulsifiers and thickeners of arabic gum are related to their protein content.

Amino acids are the main constituent components of proteins, and are divided into two groups, namely essential and non-essential amino acids. Essential amino acids cannot be produced in the body so they must be obtained in the form of food, while non-essential amino acids can be produced in the body (Elfita, 2014). Fatty acids according to Manduapessy (2017), are constituent components of fat, fatty acids consist of saturated fatty acids and unsaturated fatty acids. The ability of the human body to synthesize unsaturated fatty acids which have two or more double bonds is very limited, so these fatty acids must be obtained from food.

II. MATERIALS AND METHODS

2.1 Materials

This research material used consisted of raw materials for making albumin extract, ingredients for albumin powder making, and materials for chemical analysis. The raw material for making albumin extract, 500 grams of cork fish (Channa striatus) obtained from *Pasar Besar Malang* is still alive. The material for making albumin powder is albumin extract derived from extraction of cork fish and fillers in the form of maltodextrin and arabic gum.

In this study, the concentration of arabic gum is 50% (from cork fish) was used. 250 g of cork fish was extracted using a vacuum extractor at 70 ° C for 12.5 minutes. Furthermore, the albumin extract obtained was added by maltodextrin and arab gum according to each treatment. Then the cork albumin extract was dried using vacuum drying with a temperature of 49 ° C for ± 6 hours. The test parameters used in the main research were albumin, protein, water, ash, fat content, fatty acid profile and amino acid profile.

2.2 Albumin Analyze

Analysis of albumin levels was determined using the spectrophotometer method. A spectrophotometer is an instrument to measure the transmittance or absorbance of a sample as a function of wavelength, measurement of a series of samples at a single wavelength. In the spectrophotometric method, the sample absorbs electromagnetic radiation (transmitter), which at a wavelength of 550 nm can be seen. Determination of albumin levels can be done using the spectrophotometric method, namely: 2 cc samples or samples added with biuret reagents then heated at 37 ° C for 10 minutes. Cool then measured with electronic 20 and record the absorbance.

2.3 Protein Analyze

Analysis of protein levels can use spectrophotometric methods. The protein contained in a material can be known because of the arrangement of amino acids that bind to the peptide. The concentration of this protein can be known because of the color formed by Cu2 + ions from CuSO4 in a NaOH alkaline atmosphere (Jubaidah et al., 2016).

2.4 Water Analyze

Analysis of water content according to Susanti and Putri (2014), samples were weighed as much as 2-5 grams in porcelain dishes that had known weight. The cup is put in the oven for 5 hours at a temperature of 100 - 105 ° C or until the weight is constant. The sample is then removed from the oven and put into the desiccator and immediately weighed after reaching room temperature. Re-enter the material into the oven until a constant weight is reached (the difference between 0.002 grams in a row). The weight loss is calculated as a percentage of water content and is calculated by the formula:

$$Water\ (\%): \frac{The\ weight\ of\ sample\ and\ cup\ before\ drying\ p - the\ weight\ of\ sample\ and\ cup\ after\ drying}{sample\ weight} x\ 100\%$$

2.5 Amino Acid Analyze

Analysis of amino acid profiles can analyzed by using the HPLC method. According to Azka et al., (2015), to obtain amino acid content using the HPLC method, there are 4 steps that must be done. The first stage is the manufacture of protein hydrolyzate, ie the sample is weighed as much as 0.1 g and destroyed. The destroyed sample was added with 10 ml of 6N HCL and heated in an oven with a temperature of 100 oC for 24 hours. The second stage is filtering the sample, where the sample is filtered and taken 30 µL and added 30 µL of the drying solution (mixture of methanol, picotiocyanate and triethylamine in a ratio of 4: 4: 3). The third stage is derivatization, namely derivatization solution (mixture of methanol, sodium acetate and triethylamine with a ratio of 3: 3: 4) as much as 30 µL. This is done so that the detector can easily detect compounds in the sample. After that dilution is carried out by adding 20 ml of 60% acetonitrile or buffer sodium acetate 1 M and left for 20 minutes. The fourth stage is injection into the HPLC, where 40 µL of the filter is taken to be injected into the HPLC. Calculation of amino acid concentrations contained in the material can be done by making standard chromatography using feed-ready amino acids that have experienced the same treatment as the sample.

2.6 Fatty Acid Analyze

In analyzing fatty acids according to Perkins (1975), it can be done by methylation. The first step is to weigh l ± 150 mg of the sample in the form of oil, then dissolve it in 2 ml of 0.5 N KOH in methanol. Then reflux for 5 minutes. Then 2 ml BF3 methanol 15% refluxed for 5 minutes and added 4 ml heptan. Then reflux again for 2 minutes. Add 5 ml of anhydrous and Na2So4 saturated NaCl solution sufficiently, after which it is cooled to room temperature. After cooling, the solution is put in a separate flask, shaken and left for a while so the heptan is separated. After that the solution is taken and put in a closed test tube to be injected into the GC.

III. RESULTS AND DISCUSSION

3.1 Albumin

The albumin content in albumin powder at the concentration of arabic gum fillers (50%) which is equal to 1.98%. The high and low level of cork albumin powder albumin is thought to be caused by the raw material of albumin powder itself, which is cork fish. The higher the albumin level in the raw material, the higher the albumin level of cork fish albumin powder (Setiawan, 2013). Suprayitno (2015) added, the protein content in cork fish is 25.2g / 100g of fresh cork fish and contains albumin of 62.24g / kg.

3.2 Protein

The protein content in albumin powder at the concentration of arabic gum fillers (50%) which amounted to 21.33%. The higher the concentration of addition of arabic gum fillers and the lower the concentration of maltodextrin affects the higher protein content of the final product. This is caused by different compositions between arab gum and maltodextrin. Gum arabic contains glycoproteins. This protein in arabic gum contributes to the binding of extracts through noncovalent bonds between polypeptides. The addition of high maltodextrin does not affect the final protein content, this is because maltodextrin is a polysaccharide that does not contain protein which affects the binding ability of proteins (Kania et al., 2015).

3.3 Water

The water content in albumin powder at the concentration of arabic gum fillers (50%) which is 6.06%. The higher the concentration of arabic gum is added, the higher the water content of the cork fish albumin. Water content is influenced by molecular

weight, the greater the concentration of arabic gum used in solution, the micro-moisture content of encapsulants will also increase (Gardjito et al., 2006). The increase in water content was inversely proportional to the increase in levels of maltodextrin. This is because maltodextrin can increase the total solids of the dried material. So that the amount of evaporated water is less, consequently the increase in maltodextrin will reduce the water content. In addition, one of the properties of maltodextrin is being able to bind the free moisture content of a material resulting in the addition of more maltodextrins which can reduce the water content of the product (Yanuwar et al., 2007).

3.4 Amino Acid Composition

Table 1. Results of analysis of amino acid powder of cork fish albumin

No.	Asam Amino	Level (%)
1.	Aspartic Acid	0,36
2.	Glutamic Acid	0,40
3.	Serine	0,21
4.	Histidine	0,07
5.	Glycine	0,27
6.	Threonine	0,14
7.	Arginine	0,13
8.	Alanine	0,23
9.	Tyrosine	0,03
10.	Methionine	0,23
11.	Valine	0,08
12.	Phenylalanine	0,40
13.	I-leucine	0,20
14.	Leucine	0,08
15.	Lysine	0,36
	Total	3,19

Based on Table 1, the results of analysis of amino acid profiles of cork fish extract using the HPLC method can be read as many as 15 amino acids from 21 amino acids. It is known that the highest amino acids in cork albumin powder are glutamic acid, phenylalanine, aspartic acid, and lysine. The high and low amino acid content in a processed product can be caused by the parameters of processing, storage, fish species, and freshness of raw materials (Pratama, 2013). According to Yuniarti et al. (2013), high levels of glutamic acid in cork albumin powder because glutamic acid is a natural component in almost all foods containing proteins such as meat, fish, and milk

3.5 Fatty acid composition

Table 2. Results of Analysis of Fatty Acid Profile of Cork Fisk Albumin Powder

No.	Fatty Acid Type	Level (%)
1.	Caprilic acid, C8:0	0.09
2.	Capric acid, C10:0	0.05
3.	Lauric Acid, C12:0	0.35

4.	Tridecanoic Acid, C13:0	0.06
5.	Myristic Acid, C14:0	2.89
6.	Myristoleic Acid, C14:1	0.06
7.	Pentadecanoic Acid, C15:0	0.90
8.	Palmitic Acid, C16:0	23.46
9.	Palmitoleic Acid, C16:1	3.26
10.	Heptadecanoic Acid, C17:0	1.10
11.	Cis-10-Heptadecanoic Acid, C17:1	0.38
12.	Stearic Acid, C18:0	5.55
13.	Elaidic Acid, C18:1n9t	0.23
14.	Oleic Acid, C18:1n9c	15.82
15.	Linoleic Acid, C18:2n6c	0.63
16.	Arachidic Acid, C20:0	0.23
17.	γ-Linolenic Acid, C18:3n6	0.00
18.	Cis-11-Eicosenoic Acid, C20:1	0.15
19.	Linolenic Acid, C18:3n3	0.48
20.	Heneicosanoic Acid, C21:0	0.10
21.	Cis-11,14-Eicosedienoic Acid, C20:2	0.09
22.	Behenic Acid, C22:0	0.26
23.	Tricosanoic Acid, C23:0	0.06
24.	Cis-13,16-Docosadienoic Acid, C22:2	0.03
25.	Lignoceric Acid, C24:0	0.13
	Total	56.32

Based on Table 2, the results of the analysis of fatty acid profiles of cork albumin powder using the AOAC method can be read as many as 25 fatty acids. The highest fatty acid content in cork albumin powder is palmitic acid, and oleic acid. The high and low fatty acids in the product can be caused by these fatty acids which cannot stand the heat during the drying process (Liputo et al., 2013). According to Hastarini et al. (2012), high levels of palmitic acid and oleic acid in cork fish albumin powder because the two acids are the main components of fatty acid constituents in the oil produced by fish. The lowest fatty acid level in cork fish albumin powder is docosadienoic acid.

IV. CONCLUSION

Cork fish albumin powder can be used as a source of albumin because it contains 15 types of amino acids and 27 types of fatty acids. Of the types of amino acids and fatty acids present in cork albumin powder have an important role in the process of wound healing including the types of glutamate, arginine, and aspartate acids. As for the types of fatty acids that play a role in the wound healing process, EPA and DHA.

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