CHARACTERIZATION OF THE OIL FROM ABDOMEN PART OF CATFISH (PANGASIUS HYPOTALAMUS)

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ABSTRACTS

Introduction: *Indonesia occupies the fourth largest position in the world as a producer of catfish (Pangasius hypotalamus). The content of Polyunsaturated Fatty Acid (PUFA) in catfish oil has a good impact as an antioxidant, which can prevent hypertension, inhibit cancer growth, and play an important role in increasing the body's immune response. The process of obtaining oil is required first without using organic extraction so that fish oil can be consumed in general. Catfish processing industry produces solid waste and by-products, so by product of catfish processing fat abdomen potential to be a source of quality fish oil.* ***Methodology:*** *This study aimed to determine the rendering methode and extraction time, and determine the physico-chemical characteristic of fish oil from fat obdominal fat of catfish. Extraction of fat abdomen from catfish is carried out by rendering at a temperature of 700C for 3 hours.* ***Research findings:*** *The results showed viscosity 69cP, extraction yield 16,57%, acid value 1,49±0,01, peroxide value 4,32±0,07 and iodine value 70.12±0,07.* ***Conclusions:*** *Catfish oil has potential application in functional food oils. Physicochemical properties (acid value, peroxide, viscosity, and water content) of catfish oil were acceptable with standards for fish oil.*

Keywords *: Emergency Medicine, Instructional Methods, Perspective, Self confidence, Sudan*

1. Introduction

Indonesia is known to have rich fisheries resources large enough. Based on the data obtained, the total number of fish species present in Indonesia has 7000 species and 2000 of them are aquatic fish offer. Of the 2000 species of freshwater fish, there are at least 27 types which is cultivated by the Indonesian people[1]. Freshwater fish are fish whose habitat is in land waters. Fish- Cultivated fish are a type of consumption fish Economic value is important as a source of community income. Catfish (*Pangasius hypopthalamus*) is one of the commodities quite prospective fisheries. This fish is relatively easy to catch cultivate because pond water for cultivation can use water stagnant/does not have to be circulated. Marketing isn't difficult either relatively affordable price. Catfish contains protein, fat, vitamins, excellent mineral. Catfish processing industry produces solid waste and by-products, so by product of

catfish processing fat abdomen potential to be a source of quality fish oil.

Main fatty acids in the oil from the stomach contents of catfish consists of palmitic acid 34.19% and oleic acid 35.97% with a polyunsaturated fatty acid composition (PUFA) namely 12.35%, in the form of fatty acids linoleic, linolenic, eicosapentaenoic (EPA), and docosahexaenoic (DHA). Content PUFA, especially EPA and DHA high allows fish oil to be susceptible to oxidation and hydrolysis reactions produces color, smell and taste undesirable, as well as loss of nutritional value[2].

The main source of oil is waste catfish is fat The abdomen is part of the contents catfish stomach, then it needs to be done research on extraction oil from the abdominal fat of catfish to minimize oil damage and Get good quality oil. This research aims to determine physico-chemical characteristics and composition Crude and pure fish oil fatty acids from abdominal fat from fish waste[3].

2. Methods

2.1 Material

This research uses raw materials in the form of catfish stomach contents waste. Catfish abdominal waste The size used is around 350 grams. The reagents used were ethanol p.a, potassium hydroxide (KOH), hydrochloric acid (HCl), chloroform, Wijs reagent, sodium thiosulfate, methanol, sodium hydroxide (NaOH), n-hexane, boron trifluoride (BF3), and sodium chloride were obtained from Merck (Germany).

2.2 Fish Oil Preparation

Extraction of fish oil from waste (abdomen fat) of smoked catfish processing is carried out using dry rendering (heating) referring to the method[4] with modifications. The abdominal fat was separated from the stomach contents of the catfish, washed thoroughly and drained, then cut into small pieces, and heated using a hot plate for 3 hours at 70ºC. After heating, the stomach fat is filtered using a filter cloth until the yield is obtained in the form of a liquid.

2.3 Catfish Oil (CFO) Characterization

Determination of the physical-chemical properties based on the standard method of the Association of Official Analytical Chemists (AOAC), the aspect of the properties of fish oil consists of determining the physical-chemical number; acid, peroxide, iodine, saponification value and analysis of the fatty acid profile[5] .

2.3.1 Determination of Acid Value

Oil samples (for the head 1 g and flesh 1 g) was accurately weighed into Erlenmeyer 250 mL and then added with 50 mL of neutralized ethanol 95% and 2 mL of phenolphthalein indicator solution 1%. The oil samples were titrated with 0.1 N KOH-ethanolic until the appearance of the firstpermanent pink color. The titration was titrated in three replicates. The acid value was calculated as:

$$Acid\ Value = \frac{\text{KOH Volume (ml)} \times \text{N KOH} \times 56{,}1}{\text{mass of sample (g)}}$$

2.3.2 Determination of Peroxide Value

1 gram of each sample fish oil was accurately weighed into a 250 mL Erlenmeyer flask then 30 mL of acetic acid and chloroform (3:2) were added, and mix well. The mixture was added with 0.5 mL of saturated potassium iodide solution and allowed to stand for exactly 1 min in a dark room. After that, the mixture was added with 30 mL of distilled water and swirled to mix. A starch indicator (1 mL) was added. Then titrated with 0.1 N sodium thiosulfate until the blue color disappeared. Peroxide value was calculated as:

$$Peroxide\ Value = \frac{\text{Sodium thiosulfate Vol (ml)} \times \text{N Sodium thiosulfate} \times 1000}{mass\ of\ sample\ (g)}$$

3. Results

3.1 Fish Oil Preparation

The flesh and head of catfish were taken and the oils contained were extracted using dry rendering. This method is suitable for use on an industrial scale because the extraction process does not use harmful solvents. Dry rendering methods were successful to obtain crude catfish abdominal oil visually, show in Figure 1. The oil had a more light-yellow color compared.

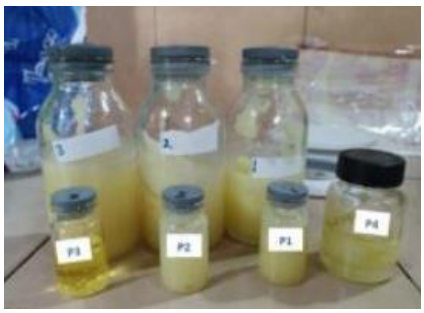

Fig. 1 The visual of catsfish abdominal oil

3.2 Catfish Oil Characterized

All catfish oil is subjected to characterization by determining their acid (AV), peroxide (PV), extraction yield, water content, and viscosity, results were compiled in Table 1.

Tabel 1: Catfish Oil Characterization

No	Parameters	Catfish Oil
1	Acid value (mg KOH/g)	1,49±0,01
2	Peroxide value (meqO2/1000g)	4,32±0,07
3	Iodine Value (g I2/100 g)	70.12±0,07
4	Extraction yeild	16,57%
5	Viscosity	69cP

4. Discussion

The acidity of oil is an important quality parameter related to the presence of free fatty acid (FFA) and other non- lipid acid compounds [6]. The acid value (AV) was determined to express the acidity of studied fats and oils. Acid value can be used to determine the degree of hydrolysis in an oil sample during storage. The quality of oil will decrease if the value of the acid number is higher [7] . The study free fatty acid of catfish oil from fresh and frozen shown that catfish oil from fresh is better than frozen [8]. Based on SNI dan IFOS, the standard of free fatty acids in oil is 3.0 mg KOH/g and catfish oil head and flesh have met the quality requirements. The acid value of catfish head oil and catfish flesh oil were significantly different ($p<0.05$).

Peroxide value is the most value to determine the degree of oil damage during oxidation. The oil damage can occur due to the oxidation process by oxygen from the air binding unsaturated fatty acid in the oils during heat processing[9]. The smaller PV means better quality. Based on statistical analysis CHO dan CFO were significantly different (p< 5.0 meqO2/1000g.

Iodine value and saponification value to determine of composition fatty acid from oil[10]. Iodine value is a measure of overall unsaturation degree, defined as the number of grams of iodine absorbed by 100 g of fats or oils. High iodine value shows that the oils contain a higher degree of unsaturation and have good quality. Saponification value is an index of the average molecular mass of fatty acid in the oil sampels. SV is the number of miligrams of potassium hydroxide required to neutralize the fatty acid resulting from complete hydrolysis of 1 g of oil samples. The high SV indicates that the oil sampels had a lower molecular weight of fatty acid.

Oil viscosity generally increases with increasing carbon chain length and will decrease with increasing temperature. The greater the temperature of the fluid, the smaller the viscosity. The viscosity and physical changes of an oil will determine the amount of free fatty acids. Qualitatively, it shows that good cooking oil is cooking oil with high viscosity and refractive index values[9] . The viscosity value of catfish oil from this study is possibly higher due to differences in extraction methods. Heating for a long time will cause oxidation so that the double bonds in unsaturated fatty acids will be broken. The results of this research are

in accordance with IFOMA standards, namely between 60 - 90 cP.

5. Conclusions

Catfish oil has potential application in functional food oils. Physicochemical properties (acid value, peroxide value, iodine value, and viscosity) of catfish oil were acceptable with standards for fish oil.

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