

Fatty Acid Profile of Betok Fish Oil (*Anabas Testudineus*)

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Abstract

Introduction

Betok fish is freshwater fish found in South Sumatera, Indonesia. Betok fish contains the main nutrients needed by humans, including proteins, fats, vitamins and minerals. Fatty acids contained in fish play a role in dealing with various health problems and optimization of brain and nerve development.

Aim of The Study

To know the profile and composition of fatty acid content from fish oil of betok.

Methods

Betok fish (*Anabas testudineus*) is obtained from Musi River Palembang, South Sumatra. Fishes were boiled by wet rendering method, in order to get fish oil betok. The analysis of fatty acid profile of fish oil was done by Chromatography Gas.

Results

Omega 3 content of fish oil of betok was 2,45%. Meanwhile, the content of omega 6 in fish oil betok of was 5.58%. The content of PUFA (polyunsaturated fatty acid) was 55.95%.

Conclusion

Fish oil had high content of PUFA and had the potential to be developed as a

modality to improve individual health.

Keywords : Betok Fish Oil – Omega 3 – Omega 6 – PUFA – Fatty Acids

INTRODUCTION

Fish is one of the most important sources of nutrients for survival. Fish contain the main nutrients needed by humans, including proteins, fats, vitamins and minerals. Fish contain unsaturated fatty acids, especially omega 3 fatty acids, which are important for brain development (Steffens, 2006; Fawole et al., 2007). In the human body, omega 3 fatty acids, will be converted into docohexaenoic acid (DHA), which is the main source of nutrients for brain and nerve cell development (Kolanowski, 2005). Other studies, showing the role of omega-3 fatty acids as anti-atherosclerotic, will inhibit the synthesis of low-density lipoprotein (LDL). LDL is the initiator of sclerosis plaque formation, which will lead to blockage of blood vessels (Steffen, 2005). Other studies have shown that omega 3 fatty acids are beneficial in the treatment of hyperactive patients and mental disorders, such as obsessive compulsive disorder, depression and Alzheimer's (Mohamed, 2011; Ackman, 2002). Fish oil contains omega 3 fatty acids (eicopenthanoic acid, docohexaenoic acid), omega 6 (linoleic acid, arachidonic acid) and omega 9 (oleic acid). These three fatty acids are classified as poly-unsaturated fatty acid (PUFA) fatty acids (Kolanowski, 2005, Massaro, 1999).

Betok fish is freshwater fish found in South Sumatra, Indonesia. The shape of this fish is oval with a large head and flattens backwards. The body is covered in green scales on the back and white shiny on the abdomen. Betok fish are found in rivers, lakes, swamps, puddles can also eat small shrimp, small fish and other water animals (Zalina et al., 2012) that the fish have a long dorsal fin, from the neck to the front of the base of the caudal fin, The front supported by 16 - 19 hard fingers pointed like thorns: the back is shorter than the front; Supported by 7 - 10 soft fingers. The anal fin is shorter than the dorsal fin, front supported by 9 to 11 hard sharp fingers and the back supported by 8 to 11 soft fingers. Pectoral fin does not have hard fingers, supported by 14 - 16 soft fingers; Lies more down on the body behind the gill cover. The abdominal fins are located in front, below the pectoral fins, supported by a hard pointed fingers and 5 soft fingers. The hard fingers of the abdominal fins can be moved and can be used to move on the surface of the dry mud. The bases of the pectoral fin, the caudal fin, the dorsal fin and the soft anal fin, all contain muscle and are covered with small scales (Zalina et al., 2012). Aims of the study was to explore the content of fatty acids, especially omega 3 and omega 6, in fish oil betok. Where, has never been explored the content of fatty acids from fish oil betok.

METHODS

Sample of Betok Fish

Betok fish (*Anabas testudineus*) is obtained from Musi River Palembang, South Sumatra. Furthermore, the sample is determined by Faculty of Science, Universitas Sriwijaya.

Extraction of Betok Fish Oil

The Extraction process began with the fish processing betok. The betok fishes were washed with running water, then cleaned from the dirt, including the fish's contents. The fish was then boiled using wet rendering method (AOAC, 2000), where the milled fish was mixed with water at a ratio of 1:10. Next, the fish were cooked with a double jacket at a temperature of 85°C-95°C (optimum temperature 90°C) for 60 minutes. Fish oil located on the surface of the decoction was separated. Then fish oil that had been obtained, carried out purification by screening. Subsequently, the filtered fish oil was subjected to cooling by storing in the coolant temperature 4°C for 12 hours. The cooled oil would form three layers, the most basic layer was water, the second layer was free fatty acid and phosphatide and the top layer was fish oil.

Fatty Acid Analysis

The fish oil sample was converted to FAMES according to the AOAC method. The fish oil (0.3 ml) sample was methylated with 1.5 mL Na-methanolic addition and heated at 65°C for 15 minutes and then added 1.5 mL of BF₃-methanol and heated at 65°C for 15 minutes. Furthermore, the solution was extracted with 0.5 mL of N-heptane and 1 mL of NaCl. The top layer (1 uL) is injected into the Chromatography Gas.

Statistic Analysis

The results were presented in the form of narration and table, in the form of fatty acid content from fish oil.

RESULTS

The results showed that the content of omega 3 in fish oil betok was 2.45%. Meanwhile, the content of omega 6 in fish oil betok was 5.58%. The content of PUFA (polyunsaturated fatty acid) amounted to 55.95% consisting of lenolelaidic acid methyl ester (45.57%), linolenic acid (1.5%), eicosatrienoic acid (0.12%), EPA (0.13%), DHA (0.7%), linoleic acid (5.19%), eicosadienoic acid (0.39%), Cis-4-7-10-

13-16-19-docosahexaenoate (0.7%), Methyl Cis-5-8-11-14-17-Eicosapentaenoate (0.13%), Cis-11-14-17-eicosatrienoic Acid Methyl Ester (0.12%), Cis-8-11-14-eicosadienoic Acid Methyl Ester (0.33%), Cis-11-14-eicosadienoic Acid Methyl Ester (0.39%), and Gamma-linolenic Acid Methyl Ester (0.68%).

Table 1: Fatty Acid Profile of Betok Fish Oil

No.	Parameter	Result	Unit
A.	Saturated Fatty Acid and Unsaturated Fatty Acid		
1.	Methyl Tetradecanoate	1,21	% Relative
2.	Methyl Pentadecanoate	0,2	% Relative
3.	Methyl Palmitate	26,25	% Relative
4.	Methyl Palmitoleat	6,59	% Relative
5.	Methyl heptadecanoate	0,35	% Relative
6.	Cis-10-Heptadecenoic Acid Methyl Ester	0,18	% Relative
7.	Trans-9-Elaidic Acid Methyl Ester	8,67	% Relative
8.	Lenolelaidic Acid Methyl Ester	45,57	% Relative
9.	Methyl Lenoleate	5,19	% Relative
10.	Gamma-linolenic Acid Methyl Ester	0,68	% Relative
11.	Methyl Lenolenate	1,5	% Relative
12.	Methyl Heneicosanoate	0,13	% Relative
13.	Cis-11-14-eicosadienoic Acid Methyl Ester	0,39	% Relative
14.	Methyl Docosanoate	0,28	% Relative
15.	Cis-8-11-14-eicosadienoic Acid Methyl Ester	0,33	% Relative
16.	Cis-11-14-17-eicosatrienoic Acid Methyl Ester	0,12	% Relative
17.	Methyl Tricosanoate	0,66	% Relative
18.	Methyl Lignocerate	0,1	% Relative
19.	Methyl Cis-5-8-11-14-17-Eicosapentaenoate	0,13	% Relative
20.	Methyl Nervonate	0,7	% Relative
21.	Cis-4-7-10-13-16-19-docosahexaenoate	0,7	% Relative
B.	Omega 3	2,45	% Relative
1.	Linoleat Acid	1,5	% Relative
2.	Eicosatrienoat Acid	0,12	% Relative
3.	EPA	0,13	% Relative
4.	DHA	0,7	% Relative
C.	Omega 6	5,58	% Relative
1.	Linoleat acid	5,19	% Relative
2.	Eicosadienoat acid	0,39	% Relative

DISCUSSIONS

PUFA is a component of fatty acids that play a very important role in maintaining the

health and vitality of the body (Calder, 1996). PUFAs are fatty acids with carbon chains between 16-26 and have double bonds on one or more carbon chains. The content of PUFA in betok fish oil (55.95%) was higher than that of PUFA from marine fish oil, such as tuna, which contained only PUFA (25.29%) (Swapna et al., 2010; Ugoala et al., 2008 ; Wan Rosli et al., 2012). Meanwhile, for omega 3 of fish oil of betok (2.54%), it has lower content than from tuna fish (11.21%) (Endinkeau et al., 1993; Boran, 2011; Luczynka et al., 2012; ; Nurnaida et al., 2011). Similarly, the content of omega 6 from betok fish oil betok was 5.58%, lower when compared to tuna 9.56%. However, the omega 3 and omega 6 content of betok fish oil was higher when compared to other freshwater fish, such as catfish, where omega 3 content in catfish is only 1.1% and omega 6 is 2.32% (Hwang, 2004; Gutierrez, 1993). Betok fish oil was high PUFA, lenoleic acid methyl ester (45,57%), where this fatty acid is homolog of linoleic acid (omega 3).

CONCLUSIONS

Fish oil had high content of PUFA and had the potential to be developed as a modality to improve individual health.

ACKNOWLEDGMENT

This research was funded by Universitas Sriwijaya (Unggulan Kompetitif), Palembang, Indonesia. We thank to Maisha Pusrita, S.T for assistance analysis of fatty acid.

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