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Original Article

FATTY ACID PROFILE AND MONTHLY VARIATION OF TOTAL FATTY ACID AND LIPID OBTAINED FROM THE OIL OF STRIPED SNAKEHEAD *CHANNA STRIATA*

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ABSTRACT

Objective: This project was taken up for a period of two years to assess the nutritional capacity of *Channa striata*, which is consumed as a cheap, nutritious food in most parts of India and East Asian countries by determining its fatty acid profile and monthly variation of lipid and fatty acid in its most edible part.

Methods: Total lipid was extracted by conventional methods laid down by Folch and his associates and was then saponified to obtain the total fatty acid. The fatty acid mixture thus obtained was then converted to their methyl esters and was subjected to Gas Chromatograph using a flame ionization detector to detect the individual fatty acids.

Results: Our investigation shows that the total lipid and fatty acid in the edible part dip to its minimum in the month of July, as one should expect during the breeding season because the stored lipid, as well as fatty acids, are mobilized to the gonads for their development during the reproductive season which is monsoon. *C. striata* contain more of MUFAs (64.34%) and PUFAs (16.21%), which are more beneficial to human health than SFAs (12.5%), which are most hazardous to health.

Conclusion: *C. striata* can definitely be marked as a cheap, nutritious food source, with its share of negativity. Our work will surely enlighten future works on this species in the spheres of preservation, organized farming, and maintaining the biodiversity of the place where it thrives.

Keywords: *Channa striata*, Fatty acid profile, Monthly variation, EPA, DHA, Palmitoleic acid, Erucic acid

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INTRODUCTION

As fatty acids possess numerous health benefits [1-9] they are recognized as essential nutrients in both human and animal diets. Fatty acids are also used in the pharmaceutical industry. It is now a well-established fact that saturated fatty acids can cause cardiovascular diseases, whereas unsaturated fatty acids have cardio-protective properties and promote cellular function. Since essential fatty acids have anti-inflammatory properties, they are effectively used in the nutritional treatment of asthma, arthritis, allergies, and many skin disorders. Diabetes, menopausal problems, memory and learning disabilities, depression, eye, and digestive disorders can be improved by dietary supplementation of essential fatty acids. Even cases of immune system disorders like multiple sclerosis, cancer, and lupus have been reported to be lowered by essential fatty acids [10-14].

Fishes are known to be rich sources of polyunsaturated fatty acids (PUFA). ω-3 and ω-6 PUFA's are known to be beneficial to human health [15, 16]. Due to the multi-dimensional nutritional benefits of unsaturated fatty acids, its consumption as a dietary supplement has gained popularity. Fish is the most important natural source of fatty acids; thus the study of the fatty acid profile of fishes has gained importance.

We have chosen to study the most consumed part i.e. the muscle tissues of wild *Channa striata,* also known as striped snakehead fish (locally shoul) belonging to the Channidae family. This fish is a freshwater, air-breathing predator, consumed as a valuable protein source. Studies on this fish have also revealed it's pain-relieving and wound healing properties [17-22].

Though the fatty acid composition of various Channa sp. fish has been studied in various Asian countries [23-27], very little is known about such composition of this fish species found in the Indian peninsular region [28]. So we have taken up the task of studying the fatty acid profile and also the monthly variation of lipid and fatty acid content in the muscle tissues of *Channa striata* found in West Bengal, India to determine its nutritional capacity. Such extensive studies are very much required for preservation, systemic farming, and maintaining the biodiversity of a region.

MATERIALS AND METHODS

The study was carried out from March 2017 to March 2019. Three wild live fish samples were collected from the local market of Chinsurah, Hooghly, West Bengal, India in the first week of every month. Maintaining this strict time frame every month, they were brought to the laboratory and stored at-30 °C [29] in a freezer after killing them by hitting on their heads. The average weight of the fishes was about (825±86.60) Gms.

Their proximate compositions were analyzed according to the method of AOAC [30]. The muscle and tissues, which are the edible portions, were separated from the head, skin, and viscera. The body muscles were cut into small pieces after removal of the bones and blended in a sterilized blender for 30 seconds. For extraction and purification of the total lipids, the method prescribed by *Folch et al.* [31] was followed using 5 Gms of the minced pieces in chloroform: methanol mixture. The total lipids thus obtained were then saponified and collected. Acidification of this saponified portion was then done by adding 6(N) hydrochloric acid till pH 1 was reached. The total fatty acids obtained were dried and weighed in a 0.0001 gm sensitive balance. The total fatty acid percentage was found by means of the total lipid. The result obtained is shown in table 1. Using the BF_3-MeOH mixture the methyl esters of the extracted fatty acids were prepared and were recovered in heptanes. The Fatty Acid Methyl Esters (FAME) thus obtained were purified and analyzed by Gas Chromatograph, Shimadzu Gas Chromatograph (Model: GC-2010, Shimadzu, Japan), with a Flame ionization detector (FID) on a split injector.

For FAME analysis an SP-2560 capillary column (100 m long x 0.25 mm i. d) was used. As a carrier gas, oxygen-free nitrogen was used at a flow rate of 33.9 ml/minute. The oven temperature was gradually raised to 240 °C at a rate of 4 °C/min. with intervals of 5 min from 140 °C. Finally, the temperature was held at 240 °C for 20 min.