



## Variations of Fatty Acid Content in The Muscle of Fish *Channa striata* (Bloch)

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### Abstract

Biochemical studies on fish tissues have drawn the attention of several researchers because tissues are major source of protein, carbohydrate and lipid and have high calorific value. The aim of this study is to determine the seasonal variation of the muscle fatty acids composition of *Channa striata*. In the reproductive phases of *Channa striata*, muscle fatty acid was increased in pre-spawning and spawning phase. Different phases of maturation were associated with marked quantitative fluctuation of muscle fatty acid contents. This quantitative variation of fatty acid content in muscle was discussed with respect to the stages of reproduction

**Keywords:** Seasonal variation, *Channa striata*, muscle, fatty acid.

### Introduction

In India, fishes are distributed in different types of habitats. The abundance of marine and inland waters may be attributed to the wealth of fish fauna which is evident from the remarks of Jhingran (1975) that, "Potentially the vast and varied inland fishery resources of India are one of the richest in the world." It therefore requires extensive research as it would provide rich source of fish food.

Body composition illustrates the nutritional quality of the food because analysis of biochemical composition including protein and fat is very important in assessing food value (Kamal, 2007). Biochemical studies of fish tissue are of considerable interest for their specificity in relation to the food values of the fish and for the evaluation of their physiological needs at different periods of life. It is also necessary to have the data on the composition of fish in order to make the best use of it as food and also to develop the technology of processing fish and fish products. Therefore biochemical evaluation is necessary to ensure the nutritional value as well as eating quality fish. (Azam, 2004).

Fish are not only beneficial protein source but also contain considerable amount of unsaturated fatty acids and thus the studies on lipid biochemistry have been considered so important (Atchison, 1975; Farkas and Csengeri, 1976; Farkas *et al.*, 1978; Dave *et al.*, 1976; Akpinar, 1986 a). Lipids are the most important biochemical compounds of fish (Akpinar, 1986 b). Fish store the lipids in various organs; particularly in muscles and liver. A great amount of these lipids are transferred to different parts of the body to be used for various physiological

actions (Yilmaz, 1995). Depending upon the level of lipids in the fish muscle, fishes are classified into three categories viz., fat fish with >8% average fat content, moderately fat fish with fat content varying between 1 and 8% and lean fish with fat content <1% (Srivastava, 1999).

Fish lipids are known to contain n-3 series unsaturated fatty acids which reduce the level of serum triglyceride and cholesterol. As a result of this, sudden heart attacks ratio and the risk of thrombosis, which is mainly the reason for heart attacks, are reduced. Some researchers reported that n-3 fatty acids facilitate some cancer treatments such as breast tumors (Konar *et al.*, 1999; El-Sayed *et al.*, 1984). An increasing amount of evidences suggest that due to the high content of

polyunsaturated fatty acid, fish flesh and fish oil are beneficial in reducing the serum cholesterol (Stansby, 1985).

### Materials and Methods

For the present study, *Channa striata* (a snakehead) was selected.

*Channa striata* is commonly known as murrel or snakehead. Due to its air breathing habit and hardy nature, it is found quite frequently in shallow or deep parts of rivers, lake etc. with or without aquatic vegetation throughout India. In addition to being a common staple food fish, snakeheads are also consumed therapeutically for wound healing and reducing post-operative pain and discomfort. These fish are the focus of important small-scale fisheries in rivers and reservoirs throughout their range, and are also popular for pond and cage aquaculture.

Mature fishes of *Channa striata* with body weight between 400gms to 1000gms were collected from the available resources in and around Nagpur city. All the fishes were transported alive to the laboratory in plastic containers and kept in glass aquaria. After sacrificing the fish muscle was removed and the muscle was used for analysis of fatty acids. For fatty acids estimation, Stern and Shapiro's (1952) method was used. Student's 't' test was used to show the significance of variations.

**Result and Discussion**

The lipids are the most important biochemical compounds of fish (Akpınar, 1986b). Fish store the lipids in various organs; particularly in muscles and liver. On the contrary, the mammals store in adipose tissue. A great amount of these lipids are transferred to the different parts of the body to be used for various physiological actions (Yılmaz, 1995).

The decrease in amount of total lipid and fatty acids in liver and muscle of fish during the periods of gonad development and reproduction shows that fish supply the required energy from the stored lipids during this period (Ackman, 1967; Gill and Weatherley, 1984; Akpınar, 1987a; Stansby et al., 1990; Aggelousis and Lazos, 1991). The cyclic changes in the gonadal cycle of *Channa striata* is determined by calculating the gonadosomatic indices (GSI) and histological details of the gonads and on this basis, is found to be annual breeders. The cycle is divided into five phases: resting phase, preparatory phase, prespawning phase, spawning phase and postspawning phase.

In resting phase, fatty acids content is relatively high in muscles (5.64mg/gm). In preparatory phase and prespawning phase fatty acids content decreases (5.03 mg/gm and 4.13mg/gm respectively). In spawning phase it is decreases sharply to 2.77 mg/gm and in postspawning phase it increases to 3.62 mg/gm.

**Table 1:** Variations in fatty acids contents of muscles of *Channa striata* (Values in mg/gm wet weight of tissue)

Phases	Fatty acids
1. Resting phase (Control)	5.64 ± 1.165
2. Preparatory phase.	5.03 ± 0.591 NS
3. Prespawning phase.	4.13 ± 0.091 P: 0.01
4. Spawning phase.	2.77 ± 0.040 P: 0.001
5. Postspawning phase.	3.62 ± 0.244 P: 0.001

NS- Non-Significant

Muscles have highest content of lipids in resting period which subsequently are utilized as oogenesis and spermatogenesis progresses and are reduced in the preparatory phase and as the vitellogenesis commences in the prespawning period, they fall to the lowest levels. This is due to partitioning of energy between somatic components and reproductive component during breeding. The decrease in the amount of fatty acids muscles of fish during the periods of gonad development and reproduction show that fish supply the required energy from these tissues and during breeding period. Muscle fatty acids are minimum during spawning season confirming our observations of partitioning of energy between somatic (muscles) and reproductive components according to the breeding cycle.

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