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SEASONAL INFLUENCE ON MUSCLE FATTY ACID COMPOSITION OF CARP *LABEO ROHITA* (HAM.)

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Abstract
Fish is one of the main sources of protein and fat and has become a healthier alternative to meat for the last fifty years. It stores the lipids in various organs particularly in muscle and liver. The indigenous fish species *Labeo rohita* was studied in relation to the seasonal variation in muscle fatty acid content. In the reproductive phases of *Labeo rohita*, 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: *Labeo rohita*, seasonal variation, muscle, fatty acid.

Introduction

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).

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).

Materials and Methods

For the present study, *Labeo rohita* (Indian major carp) was selected. *Labeo rohita* is the most commonly cultured freshwater fish. It is commonly called as rohu. The genus *Labeo* belongs to the family Cyprinidae of the order Cypriniformes under the class Telestomi. *Labeo rohita* is widely distributed in fresh water of all Indian states. It is considered to be the most important fish because it is nutritious and delicious and it has high market value, as well as its fry and fingerlings are easily available for culture.

Collection and Maintenance of fish

Mature fishes of *L. rohita* 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. The body weight of the fishes ranged between 1kg to 3kg (*L. rohita*). 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't' test was used to show the significance of variations.

Result and Discussion

Lipids are the major energy source in fishes and their constituent fatty acids play a critical role in the maturation and reproductive success, hatching and enhanced larval survival as well as growth patterns and hence have been used to understand maturation, spawning and recruitment dynamics of many finfish and shellfish species worldwide (Appa Rao, 1967; Rao, 1967; Galap et al., 1999; Kas'yanov et al., 2002; Mourente et al., 2002).

In female plaice, *Pleuronectus plastessa* (Dawson and Grimm, 1980) and arctic copelin, *Mallalus villosus*, (Henderson *et al.*, 1984), marked depletion of body lipid and/or glycogen occurs during gonadal development. During spawning migration of Atlantic salmon *Salmo salar*, both sexes suffer a massive depletion reserves losing up to 99% of their body lipid, 72% of their protein and 63% of their glycogen (Tillik, 1932). In both sexes of copelin, lipid levels are depleted during reproduction, but the lipids are mobilized to meet the energy demands of breeding behavior (Henderson *et al.*, 1984).

The cyclic changes in the gonadal cycle of *L. rohita* 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 in muscles is 4.41 ± 0.094 mg/gm. In preparatory phase, fatty acids content decreases to 4.39 ± 0.061 mg/gm and in prespawning phase it is about to 3.88 ± 0.306 mg/gm. In spawning phase it is decreases sharply to 2.00 ± 0.351 mg/gm and in postspawning phase it is 3.61 ± 0.034 mg/gm

Table: Variations in fatty acids contents of muscles of *L.rohita* (Values in mg/gm wet weight of tissue)

Phases	Fatty acids
1. Resting phase (Control)	4.41 ± 0.094
2. Preparatory phase.	4.39 ± 0.061 NS
3. Prespawning phase.	3.88 ± 0.306 P‹ 0.05
4. Spawning phase.	2.00 ± 0.351 P‹ 0.001
5. Postspawning phase.	3.61 ± 0.034 P‹ 0.0001

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 and this decreases is statistically significant (P< 0.0001). 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 and those of gonads are highest in this season further confirming our observations of partitioning of energy between somatic (muscles) and reproductive components according to the breeding cycle. According to the results, it could be concluded that variation in fatty acids composition in present study seems to be governed by spawning cycle.

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