



An insight into milt antioxidant, fatty acid, amino acid composition and testis histology of an anadromous euryhaline fish *Tenualosa ilisha*, Ham. 1822 for its conservation and aquaculture perspectives

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ABSTRACT

Ilisha, *Tenualosa ilisha*, Ham. 1822, is the prime table fish and important commercial fish in the Indo-Pacific region. However, the species has recently declined drastically due to various factors. Our earlier studies recorded a significant association between the breeding season and its migration. Studies on milt and its biochemical properties are essential to ensure its successful conservation and artificial breeding. Here, milt samples of the fish of varied sizes were evaluated for their antioxidant property, fatty acid and amino acid content, and the histology of the testis. Analysis of milt antioxidant was done using free radicals DPPH, FRAP & ABTS methods and compared with the free-radical quenching properties of the synthetic antioxidants. High performance liquid chromatography (HPLC) and gas chromatography and mass spectrometry (GC/MS) determined the composition of amino acids and fatty acids, respectively. The highest and lowest antioxidant activity was exhibited by fish milt samples M0 (b.wt 355.6 ± 0.75 g) i.e. 04.59 ± 0.40% and M10 (b.wt 160.35 ± 0.12 g) i.e. 37.53 ± 3.59%. Most notably, the antioxidant activity was found to follow a body weight gradient. Omega (ω)-3 polyunsaturated fatty acids (PUFAs), docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) were the predominant PUFAs and among the amino acids, arginine (0.70 g/100 g) was present in the highest quantity followed by glutamic acid (0.14 g/100 g) and proline (0.14 g/100 g). The histology study of the testis reveals the change in the cells during the process of spermatogenesis. Histological images demonstrated the different stages of testis maturation of males sampled at the spawning site. This baseline information generated is of its first kind in *Ilisha*, a transboundary migratory fish in South Asian countries supporting conservation and artificial breeding for commercial production.

1. Introduction

The *Ilisha* shad, *Tenualosa ilisha* is a significant transboundary migratory economic fish of the Indo-Pacific region. The species is found in marine, estuarine, and riverine waterways, and it has a wide range of habitats. It spends most part of its life cycles at sea but migrates to freshwater rivers for spawning; it has a great nutritional value and contains omega (ω)-3 polyunsaturated fatty acids (ω-3 PUFAs), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA) (Mishra et al., 2012). However, from a fisheries perspective, the majority of counts are captured by Bangladesh, Myanmar, and India. The fish is found in the Indian riverine habitat in eastern and western India namely

the lower stretch of the Ganga, Hooghly, Rupnarayan, Bhagirathi, Godavari, Brahmaputra, Tagdi, Narmada and other coastal rivers (Bhattacha, 2012). The *Ilisha* production (~ 60%) of India is from the Ganga-Brahmaputra-Meghna (GBM) basin of West Bengal. *Ilisha* migrates towards freshwater regions periodically for spawning. The peak time for freshwater migration of the fish starts from its July and continues up to November. A vital correlation between the season of migration and the species' breeding season was noticed (Mishra et al., 2014). During spermatogenesis, spermatozoa are produced in the fish sperm and seminal plasma is developed by the gonad and spermatic ducts (Nol et al., 2006). Fertilization ability depends on the concentration and motility of spermatozoa (Cajko et al., 2008). In the external

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