International Journal of Advance and Applied Research (IJAAR)
Peer Reviewed Bi-Monthly

ISSN – 2347-7075
Impact Factor – 7.328
Vol.8 No.4 Mar–Apr 2021

NATURALIZATION IN TELEOST CLARIAS BATRACHUS

Dr. Chandan Kumar
Ph.D. (Science). VKSU. Ara. Bihar.

ABSTRACT:

This long, dark fish has lung-like organs and a high tolerance to harsh living conditions, and it can leave the water to walk/wiggle to a better location as long as it stays moist. Although it is native to Southeast Asia, it has successfully invaded other areas with the help of humans, including eastern India, Pakistan, the Philippines, and South Florida. Because of their mobility and tolerance, and their indiscriminate feeding habits, they have been labelled an aggressively invasive species and blacklisted in several countries, including the US.

INTRODUCTION:

With references to Importance to Humans within areas of its native range, the walking catfish is valued as a food fish and is the focus of both subsistence fishers and commercial farming operations. Owing to its ability to survive extended periods out of water, walking catfish can be sold and traded live with ease, ensuring a fairly fresh food product. Outside of its native range, the walking catfish is a demonstrated pest, with the potential to do severe ecological and economic harm. In response, numerous countries have "blacklisted" the walking catfish, including the United States and different part of the countries.

MATERIALS AND METHODS:

In Teleost Clarias Batrachus GS is a multifunctional enzyme, and its product glutamine has different metabolic roles. One of the important functions of GS is to trap ammonia to glutamine (for reviews, see Korsgaard et al., 1995, Ip et al., 2001b). Neural tissues are particularly sensitive to ammonia and, therefore, the high GS activity in most fish brains (Webb and Brown, 1976, Chakravorty et al., 1989, Peng et al., 1998, Wang and Walsh, 2000) is highly justified. In addition, liver can also be an important site of ammonia detoxification (Jow et al., 1999, Iwata et al., 2000). Due to the colocalization of GS along with CPS III in the mitochondria in most ureogenic fish including the

walking catfish (Casey and Anderson, 1982, Chakravorty et al., 1989, Saha et al., 1999), GS appears to play a critical role in 'fish type' OUC by supplying glutamine as the N-donor substrate for the initial step catalyzed by CPS III (for a review, see Anderson, 2001). The present study investigates the relative levels of expression of GS enzyme in different tissues, and the possible upregulation of GS and both types of OUC-related CPSes, the CPS III and CPS I-like activity in different tissues of walking catfish during exposure to HEA (25 mM NH4Cl) that would preclude the release of ammonia across the gills, triggering alternative routes to detoxify ammonia. The ammonia-N concentration in all tissues (except brain) increased significantly within the first day of exposure to 25 mM NH4Cl, followed by further increase after the third or seventh day of exposure . It increased by about 2- to 3.5-fold in all tissues (except brain) and plasma, after the seventh day of exposure. Similarly, Significant accumulation of ammonia in tissues and plasma of the walking catfish, during exposure to 25 mM NH4Cl, was possibly due to confrontation with a net influx of ammonia despite the fact that it is a facultative air-breather and its gills are partly degenerate (Dutta and Munshi, 1985). Furthermore, ammonia is known to permeate the biomembranes as NH3 (Martinelle and Haggstrom, 1993), and because the scaleless skin of walking catfish is permeable to gases (Jordon, 1976).

DISCUSSION:

Hypoxia is a frequently occurring environmental phenomenon in the freshwater and even coastal system of a tropical country like India. It may be naturally occurring phenomenon due to biological and physical factors or may be caused due to anthropogenic activities around the water bodies. Aquatic organisms which are frequently exposed to hypoxia show adaptations at behavioural, morphological and physiological levels. To assess the effect of hypoxia at physiological level, change in haematological and blood parameters in selected tissues of cat fish, Clarias batrachus and Heteropneustes fossilis was undertaken. These were exposed to experimentally provoked hypoxia for different duration and were sacrificed to study the effect of hypoxia on selected blood parameters in heart, liver, brain and muscle. Significant changes were recorded. The observations indicate that different tissues respond differently to the stress of hypoxia and the blood parameters respond in a tissue specific manner.

CONCLUSION:

The changes in the free amino acid (FAA) levels, the rate of efflux of FAAs from the perfused liver, and the activity of some enzymes related to amino acid metabolism such as glutamate dehydrogenase (GDH, both reductive amination and oxidative deamination), glutamine synthetase (GS), aspartate aminotransferase (AST), and alanine aminotransferase (ALT) were studied in the liver of a freshwater air-breathing teleost, the walking catfish, Clarias batrachus, perfused with 5 and 10 mM NH4Cl. The level of the various non-essential FAAs increased significantly, with a total increase of about 150%, which was accompanied by a significant increase of both ammonia and urea-N in the perfused liver both with 5 and 10 mM NH4Cl. The rate of efflux of these non-essential FAAs from the perfused liver also increased significantly with a total increase of about 115% and 160% at 5 and 10 mM NH4Cl, respectively. The activity of the mentioned amino acid metabolism-related enzymes in the perfused liver also got stimulated, except for GDH in the ammonia forming direction and ALT, under a higher ammonia load. The activity (both tissue and specific) of GDH in the glutamate forming direction increased maximally, followed by AST and GS in a decreasing order.

REFERENCES:

1. Campbell JW. 1991. In: CL Prosser, editor. Environmental and metabolic animal physiology. New York: Wiley-Liss Inc. p 277–324.
2. Campbell JW, Anderson PM. 1991. Evolution of mitochondrial enzyme system in fish: the mitochondrial synthesis of glutamine and citrulline. In: PW Hochachka, editors. Biochemistry and molecular biology of fishes, vol. 1. Amsterdam: Elsevier. p 43–76.
3. Foster GD, Moon TW. 1986. Cortisol and liver metabolism of immature American eels, Anguilla rostrata (Le Sueur). Fish Physiol Biochem 1: 113–124.
4. French CJ, Mommsen TP, Hochachka PW. 1981. Amino acid utilization in isolated hepatocytes from rainbow trout. Eur J Biochem 123: 311–317.
5. Iwata K, Kakuta I, Ikeda M, Wada N. 1981. Nitrogen metabolism in the mudskipper, Periophthalmus cantonensis: a role of free amino acids in detoxification of ammonia produced during its terrestrial life. Comp Biochem Physiol 68A: 589–596.