

STUDIES ON BIOCHEMISTRY AND INNATE IMMUNE PARAMETERS IN THE MUCUS OF DIFFERENT FRESHWATER FISH SPECIES

ABSTRACT

Fish is a cold-blooded vertebrate, which are exposed to all kinds of parasite, bacteria and fungi colonization in their aquatic environment. The epidermal mucus of fish is produced primarily by epidermal goblet cells or mucus cells. Mucus also acts as a first line of defense mechanism against any invading pathogens. Mucus plays a vital role in maintaining fish health by providing a physical and biochemical barrier between the fish and the environment. Very limited information is available on the immune system and the role of mucus enzymes in freshwater fish species. Hence, the present study was directed to understand the non-specific innate immune components in the mucus of six freshwater fish species such as African catfish (*Clarias gariepinus*), giant snakehead (*Channa micropeltes*), striped snakehead (*Channa striatus*), marble goby (*Oxyeleotris marmorata*), tilapia (*Oreochromis niloticus*) and bagrid catfish (*Mystus nemurus*). The epidermal mucus samples from these fishes were analysed for the specific activities of various hydrolytic enzymes such as lysozyme, alkaline phosphatase, esterase and protease, and the enzyme levels were compared among the fish species. Significantly highest levels of lysozyme, alkaline phosphatase and esterase activities were observed in striped snakehead and African catfish compared to those in other fish species. The highest activities of lysozyme, alkaline phosphatase and esterase (15.77 ± 1.25 ; 18.96 ± 6.68 ; 10.65 ± 5.84 U/mg protein) were observed in snakehead fish followed by those (13.67 ± 2.82 ; 15.06 ± 2.37 ; 16.67 ± 8.36 U/mg protein) in African catfish epidermal mucus, respectively. Highest protease activity (1630.97 ± 104.00 and 1596.4 ± 94.00 U/mg

protein) was recorded in bagrid and African catfish mucus. A wide variation in enzyme activities was noticed among the fish species and also between species of the same family, such as striped and giant snakehead (Channidae). Specific inhibitors were added to azocasein hydrolysis assay and zymography experiments to characterize the individual proteases present in the mucus of these six freshwater fish species. All the fish species showed the highest levels of serine and metalloproteases than cysteine proteases. While in zymography, serine and cysteine proteases were predominant in most fish species. The current study showed the variation in the level of hydrolytic enzymes in the epidermal mucus of different fish species. This study provided an insight into the presence and activities of various epidermal mucus enzymes and these components may possibly provide sufficient protection for fish against invading pathogenic microbes and also involve in the innate immune system of fish.