

**Assessment of immunodulatory effects of levamisole administered  
through immersion route on Catla, *Catla catla*, an Indian carp  
cultured in Sri Lanka.**

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## ABSTRACT

Non-specific immune parameters are useful as markers of disease resistance to determine the health status of fish and evaluate the efficacy of immunodulatory substances for use in fish culture in order to enhance disease resistance of the cultured fish. In the present study, effects of administration of levamisole through immersion route on some components of the immune system of an Indian carp, *Catla catla* were investigated with a view to assess the potential of using this compound as an immuno-stimulant in culturing this fish. Sub adults of Catla were given a two hour bath in 1.25 or 2.5 mg l<sup>-1</sup> levamisole solutions and the fish were subsequently transferred to cement tanks filled with fresh water until immune responses were assessed at 14, 21, 28, 42 and 56 days after the exposure period. Fish not exposed to levamisole served as controls. The parameters tested in the blood of levamisole treated and control fish were haematocrit level, leucocrit level, total white blood cell counts, differential white blood cell counts, total phagocytic activity, phagocytic index, production of superoxides by neutrophils (NBT), myeloperoxidase activity (MPO) lysozyme activity, total protein level and total immunoglobulin level. Fingerlings of Catla which had been exposed to 1.25 mg l<sup>-1</sup> levamisole for two hours were subjected to a parasitic and bacterial challenge along with the respective controls to examine the disease resistance.

Results revealed that levamisole treatment had no significant effect on blood haematocrit levels. However leucocrit levels, total white blood cell counts, abundance of neutrophils, monocytes and lymphocytes, total phagocytic activity, phagocytic

index, NBT activity, myeloperoxidase activity, total protein level were increased significantly in levamisole treated fish at 14 - 56 days post exposure to levamisole. The other immunological parameters which were tested in this study also increased though the difference were not statistically significant. No significant differences in the degree of immuno-stimulation were seen between the fish groups exposed to two exposure levels tested viz. 1.25 mg l<sup>-1</sup> and 2.5 mg l<sup>-1</sup> levamisole. For both exposure levels, most of the parameters tested were greatly elevated at 42 days post exposure to levamisole.

Levamisole treated fingerlings of Catla cohabitated with gold fish which had been infected with *Ichthyophthirius* and *Dactylogyrus* showed significantly lower infestation level in comparison to the control fish cohabitated with parasite infested fish. Levamisole treated Catla which have been challenged with 10<sup>9</sup> colony forming units of *Aeromonas hydrophila* displayed comparatively less mortalities in comparison to the control fish which received the same bacterial challenge.

The results show that levamisole is effective in augmenting several components of the immune system of Catla, especially the non specific components of the fish. The immunity can be enhanced by immersing the fish with 1.25 mg l<sup>-1</sup> or 2.5 mg l<sup>-1</sup> levamisole for 2 hours and the immune stimulation persists at least 56 days post exposure. In conclusion, administration of levamisole (1.25 mg l<sup>-1</sup> or 2.5 mg l<sup>-1</sup>) through immersion route could be practiced in *Catla catla* culture for enhancing the immunity of fish to diseases.