Probiotic supplements as an alternative medicine; investigation the Effect of *Lactobacillus casei* on liver function of Koi Fish (*Cyprinus Rubrofuscus* L.) in exposure to pathogen as an animal model

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Abstract
Some infectious diseases, such as Salmonella in ornamental fish, are important because of their potential for human transmission and antibiotic resistance. In this study, 250 koi fish with an average length of 10±3 cm and a weight of 20±1 gr were randomly divided into four groups with two repetitions. The test was performed for 24 days with diet and 72 hours exposure to *Salmonella Typhimurium. Fish are classified into four group* T1; receiving *lactobacillus casei* (1.5×10^8 CFU / ml) probiotic and not exposed to the pathogen, T2; getting probiotics and exposed to the pathogen, T3; no probiotics received but exposed to the pathogen, and control group (C). In present investigatoin, to evaluate the damage caused by *Salmonella typhimurium*, alkaline phosphatase (ALP), Alanine transferase (ALT), and Aspartate transaminase (AST) were tested in the days 0, 24 and 27 of the experiment. Based on the results, the effect of *Lactobacillus casei* probiotic in comparison with the control group on the improvement of liver function in this species of fish was investigated in such a way that the presence of probiotics alone may cause liver function in fish under normal or optimized conditions. However, the group that was not exposed to any probiotic agents showed a clear increase in the level of ALP, AST and ALT in the liver, which indicates the destruction of liver cells ($p<0.05$). However, in the group exposed to the pathogen along with the

probiotic agent, the pathogen first increased the amount of some enzymes, but finally, with the action of probiotic factors, a decrease in enzyme levels in fish can be seen ($p<0.05$). In the third group, which did not use any probiotics, to increase the level of liver function enzymes in fish is observed significantly ($p<0.05$).

Keywords: Lactobacillus casei, Salmonella typhimurium, Koi fish, Cyprinus Rubrofuscu, Alanin aminotransferase, Aspartate aminotransferase, alkaline phosphatase.