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The efficiency of probiotic *Lactobacillus* for improving the liver biochemical indices of common carp (*Cyprinus carpio*) exposed to sub-lethal levels of nano silver

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Abstract

Pollutants especially nanoparticles as emerging contaminants in water may causes stress response in fish physiology and fish health that ultimately could reduce fish immune function and, hence the use of immuno simulator such as probiotics seems very essential. A total of 250 fry carp for 42 days in three treatments of without probiotics and prebiotics level A (10^6) and Level B (10^7) were divided. Then each group exposed to 50% of nano-iron LC_{50} for 10 days. Probiotics alone hadn't a significant effect on glucose, direct bilirubin, total bilirubin and total protein ($P\geq0.05$), but silver was increased protein and reduced other indices ($P<0.05$), using combination of probiotics and silver also increased glucose, direct and total bilirubin and decreased amount of total protein ($P<0.05$). Nano-silver cause inhabitation and reduction of serum biochemical indices that lead to depletion of these indices, but using combination of probiotics and nano particle reduced inhabitation effects of nano silver and lead to elevation of indices. Overall results showed that Lactobacillus probiotic could decrease the amount of serum biochemical markers with the improvement of existing situation, but nano-silver lead to stress conditions and increased markers by creating stressful condition, and then using a combination of Lactobacillus decreased adverse effects of nano-silver.

Keywords: Improved resistance, Metallic nanoparticles, Probiotics, Biomarker, Common carp

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