

Abstract

Currently fish aquaculture industry faces serious issues of mortality on account of prevailing bacterial infections leading to considerable economic loss. The current study aims to supplement the tilapia diet with novel material, silver-zinc nanohybrids (Ag-ZnNHs) to enable them to resist infections. For this purpose, we synthesized silver zinc nanohybrids(AgZn-NHs) by capping silver nanoparticles (AgNPs) with an essential nutrient, zinc by chemical method, and characterized them with UV- Visible spectroscopy and FTIR showing peak at 350nm and Ag-O and Zn-O stretch ranging 3200-3500cm⁻¹ respectively. The same were tested for their efficacy as an infection resistant agent in a twelve-week experimental trial in which tilapia fingerlings were randomly distributed into six groups; including one comprising of the control (basal diet subjected) only. Ag-Zn NHs supplementation was provided in varying concentrations in all the five experimental groups (D2= (AgNPs 20mgkg⁻¹), D3= (ZnNPs 20mgkg⁻¹), D4, D5, D6 (5,10,15 mgkg⁻¹AgZn-NHs)); the entire study was conducted in triplicates. Hematological, such as Hb, WBC s, RBCs and HCT, renal markers, such as blood urea and serum creatinine level and liver function related Hepatic enzymes, such as CAT, SOD, and GST were studied. Significant variations were recorded (P< 0.05) in the supplemented groups as compared to the control for all the studies parameters. In-vitro antioxidant studies, such as DPPH activity, FRP assay & H₂O₂ scavenging activity proved that AgZn-NHs supplementation resulted in conservable antioxidation status at the concentration of 15 mgkg⁻¹. Similarly, the same concentrations enabled least liver tissue damage as was seen in the histological studies. Additionally, when challenged with *Aeromonas hydrophila*, the same supplementation was able to resist the infection to the maximum. Hence, 15mgkg⁻¹ AgZn-NHs can be recommended to formulate the practical diet of fish to boost health improvement, immunomodulation, and resistance to bacterial disease.