

Evaluation of antiviral activity of Silver nanoparticles against Spring Viraemia of Carp Virus (SVCV) using experimental infection in Caspian White Fish (*Rutilus frisii kutum*)

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Abstract Hygiene and disease control are the most important factors to increase the production of farmed fish. Among pathogenic microorganisms, viruses have the most sensible role and the incurred losses are much more intense than other pathogens due to the high infectivity, difficult diagnosis and high severity. In this study, antiviral activity of Silver nanoparticles against Spring Viraemia of Carp Virus (SVCV) using experimental infection in Caspian White Fish (*Rutilus frisii kutum*), was evaluated. A standard strain of SVCV (*Rhabdovirus Carpio*) No. 56/7, ATCC number Gene Bank 1/538061 AJ provided Europe Union reference laboratory, was used. The virus was inoculated onto the EPC cell monolayers and after observing the cytopathic effect (CPE) under an inverted microscope, the virus purified and maintained at -80 °C until viral exposure time. The cytotoxicity of silver nanoparticles against cell line and fingerling fish were 0.062ppm and 20 mg/liter respectively. The challenge treatments were designed in triplicates. This treatments included a negative control (control), positive control (fingerlings challenged with virus using water bath method), fingerling fishes challenged with silver nanoparticles and the virus (using the viruses immediately exposed to silver nanoparticles and the viruses exposed to silver for four hours prior to the fish challenge). Viral dose of 3.2×10^5 TCID₅₀ / ml was used in all treatments and the fish were transferred to the respective aquaria and monitored for four days. The results showed that fingerlings are susceptible to spring viremia of carp virus and silver nanoparticles could reduce the virulence of the

virus and fewer losses occurred at the same time compared to the positive control treatment, especially in the treatment of the virus which was treated with nanoparticles for four hours prior to the challenge, fewer mortality was observed than the other two treatments. According to the results, Silver nanoparticles are able to control and inactivate the spring viremia of carp virus even in their non-toxic doses. The study also showed that silver nanoparticles have an appropriate antiviral activity against spring viremia of carp virus and are effectively able to protect the fish in their non-toxic concentrations. This work is the first study in the field of inactivation of spring viremia of carp virus and can serve as the first step to prepare SVCV killed vaccines in order to protect fish species susceptible spring viremia of carp.

Keywords : Key words: SVCV, EPC, CPE, Rhodovirus carpio, fingerling, Silver nanoparticles

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