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Potential efficacy of nanodelivery of DNA vaccine using chitosan nanoparticles against *Edwardsiella tarda*

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Edwardsiella tarda (E. tarda) is the common pathogen which causes enormous losses in culture of commercially important fish species globally. Incapability of antibiotic agents to control edwardsiellosis had lead to the idea of DNA based immunization. It has been proven that the expression of an antigen or antigens from plasmid DNA (pDNA) may elicit both humoral and cellular immune responses. To improve the efficiency of the vaccine constructs against fish pathogen novel methods to deliver this DNA to fish are under investigation because vaccination through parental routes like intra muscular/intra peritoneal etc put fish into lot of stress and also practically not viable in aquaculture. Nanotechnology can be a promising intervention in increasing the effectiveness of DNA vaccines. Chitosan can be a potential candidate as a polycationic gene carrier for oral as well as immersion administration of DNA vaccines in fishes. The present study examines the potential efficacy of DNA vaccine against *E. tarda* through oral and immersion route using chitosan nanoparticles conjugation. The GAPDH gene of *E. tarda* and IFN-γ of *Labeo rohita* as an adjuvant was used to construct bicistronic DNA vaccine using pIRES, a eukaryotic expression vector. Expression study of the DNA construct in cell culture was conducted to check the transgene expression. The transfected SSN I cells were processed for SDS-PAGE and western blotting to see the GAPDH expression. RT-PCR was conducted using mRNA from transfected cells to check IFN-γ gene presence. The *in vitro* expressions of both the genes prove the potential of this particular vaccine construct. The chitosan nanoparticles were used to deliver the constructed plasmid. A significant decrease in the superoxide production, myeloperoxidase was observed in the vaccinated fish. However the total immunoglobulin level and serum lysozyme activity was raised in the immunised fishes. After vaccination *L. Rohita* were intraperitoneally challenged with *E. tarda.* A relative percent survival (RPS) rate of 8% and 75% was recorded in orally and immersion administered fishes respectively against 55% in unvaccinated fishes. The results indicate that the vaccinated rohu with chitosan-DNA construct showed high protection against experimental *E. tarda* infection. This study also elucidates the changes in the absolute expression of different immune genes in different tissues of *L. rohita* administered with the DNA construct conjugated with chitosan nanoparticles through oral and immersion route. The results are compared with the expression in naive control fishes showing significant up regulation at post vaccination and 6 hr, 12 hr and 48 hpc.

Biography

Sajal Kole is currently a PhD student in Central Institute of Fisheries Education, India.

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