

Application of Bacteriophages as Natural Antibiotics in Aquaculture

Authors : Chamilani Nikapitiya, Mahanama De Zoysa, Jehee Lee

Abstract : Most of the bacterial diseases are associated with high mortalities in aquaculture species and causing huge economic losses. Different approaches have been taken to prevent or control of bacterial diseases including use of vaccines, probiotics, chemotherapy, water quality management, etc. Antibiotics are widely applying as chemotherapy to control bacterial diseases, however, it has been shown that frequent use of antibiotics is favored to develop multi-drug resistance bacteria. Therefore, phages and phage encoded lytic proteins are known to be one of the most promising alternatives for antibiotics to avoid the emergence of antibiotic-resistant bacteria. We isolated and characterized the two lytic phages, namely pAh-1 and pAs-1 against pathogenic *Aeromonas hydrophila* and *Aeromonas salmonicida*, respectively. Morphological characteristics were analyzed by Transmission electron microscopy (TEM) and host strain specificities were tested with *Aeromonas* and other closely related bacterial strains. TEM analysis revealed that both pAh-1 and pAsm-1 are composed of an icosahedral head and a segmented tail, and we suggest that, they are new members of Myoviridae family. Genome sizes of isolated phages were estimated by restriction enzyme digestion of genomic DNA using selected endonucleases followed by agarose gel electrophoresis. Estimated genome size of pAh-1 and pAs-1 were approximately 64 Kbp and 120 Kbp, respectively. Both pAh-1 and pAs-1 have shown narrow host specificity. Moreover, protective effects of phage therapy against fish pathogenic *A. hydrophila* were investigated in zebrafish model. The survival rate was 40% higher when zebrafish received intra-peritoneal injection (i.p.) of pAh-1 were simultaneously challenge *A. hydrophila* (2×10^6 CFU/fish) compared to that without phage treatment. Overall results suggest that both pAh-1 and pAs-1 can be used as a potential phage therapy to control *Aeromonas* infections in aquaculture.

Keywords : *Aeromonas* infections, antibiotic resistance, bacteriophage, bio-control, lytic phage

Conference Title : ICFA 2017 : International Conference on Fisheries and Aquaculture

Conference Location : Toronto, Canada

Conference Dates : June 15-16, 2017