



Impact of Arachidonic Acid (AA) on *Artemia franciscana* Challenged with Pathogenic *Vibrio harveyi*

R.D.N. Wijesinghe ^{a, *}, K. Baruah ^b and G. Van Stappen ^b

^a Department of Fisheries and Aquaculture, Faculty of Fisheries and Marine sciences & Technology, University of Ruhuna, Sri Lanka.

^b Lab of Aquaculture & Artemia Reference Center, Department of Animal Production, Faculty of Bioscience Engineering, Ghent University, Rozier 44, Gent 9000, Belgium.

Abstract

Highly unsaturated fatty acid, arachidonic acid (AA), the major eicosanoid precursor has received growing interest as a health-promoting agent for animal health. Even though AA holds immunostimulant, anti-inflammatory and anti-pathogenic properties against a variety of bacterial diseases, the mode of action of this molecule is unclear yet. Present study aimed at determining whether AA could induce protective effects against vibriosis disease in aquatic organisms by using axenically cultured *Artemia franciscana* and pathogenic *Vibrio harveyi* as host pathogen model system. The experiment was designed to deliver the AA following two administrative ways, continuous and pretreatment and assessed the effect of the compound on host-pathogen interaction. The gnotobiotic model system that was used in this study eliminates any possible interference of the natural micro-biota present in the experimental system and facilitates the interpretation of the results in terms of a cause effect relationship. At first, a dose response was carried out in two ways to elucidate the effect of AA on the host-pathogen interaction. The results provided clear evidences suggesting that continuous and pretreatment of AA, at an optimum concentration of 2 μ M and 250 μ M, respectively conferred maximum protection to *Artemia* against *V. harveyi* infection. Treating *Artemia* nauplii with AA in the presence or absence of an antioxidant enzymes mixture (catalase and superoxide dismutase) verified that the *Vibrio*-protective effect of the AA was due to generation of reactive oxygen species by oxidation of the compound. Furthermore, the results on the effect of AA on colonization of *V. harveyi*, determined by means of TCBS plate counting, showed a significant reduction ($p < 0.05$) of *Vibrio* counts in treated groups after 48 h of challenge. The overall findings suggest that the ability of AA to induce protective effects makes it a potential agent for controlling vibriosis in aquaculture.

Key words: Arachidonic acid, *Artemia*, continuous treatment, pre-treatment, *Vibrio harveyi*

***Corresponding Author:** dilani.rusl@gmail.com