The effect of single and combined vaccines against *Streptococcus iniae* and *Vibro harveyi* on digestive enzymes of Asian sea bass (*Lates calcarifer*)

Yasaman Mohammadi¹ Mehrzad Mesbah² Mojdeh Chelemal Dezfoulnejad^{4*} Mehdi Shamsaie Mehrgan⁵ Houman Rajabi Islami⁶

- 1, 5, 6. Department of Fisheries, Science and Research Branch, Islamic Azad University, Tehran, Iran.
- Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
- Member of Excellence Center of Warm Water Fish Health and Diseases, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
 Department of Fisheries, Ahvaz
- 4. Department of Fisheries, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran.

*Correspondence author:

mojdeh-chelemal dez foulnejad@iauahvaz.ac.ir

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Abstract

The aim of this study was to investigate the effects of single and combined vaccines against Streptococcus iniae and Vibro harveyi on the activity of digestive enzymes in Asian sea bass (In the fall of 1398). The fish were randomly divided into 7 experimental groups including phosphate buffer saline (control), S. iniae vaccine by injection, S. iniae vaccine by immersion method, V. harveyi vaccine by injection, V. harveyi vaccine by immersion method, S. iniae / V. harveyi vaccines by immersion method, S. iniae / V. harveyi vaccines by injection. All groups were divided into three replications and the duration of the experiment was 60 days. Fish sampling was performed on days 0, 30, and 60 of the experiment. The results of the present study showed a significant increase in the levels of trypsin and alpha-amylase in all groups compared to the control group 60 days after vaccination. Also, immunization of Asian sea bass with the vaccines used caused a significant increase in the level of chymotrypsin in V. harveyi vaccine by injection and immersion groups compared to the control group at the end of the experimental period. The results also showed a significant increase in protease enzyme levels in S. iniae vaccine by immersion group and lipase enzyme levels in S. iniae vaccine by injection, V. harvevi vaccine by injection, V. harvevi vaccine by immersion, and S. iniae / V. harveyi vaccines by immersion groups compared to the control group. In addition, a significant increase in alkaline phosphatase enzyme levels was observed in S. iniae vaccine by injection and V. harveyi vaccines by immersion groups compared to the control group. The results of this study suggest that single and combined vaccines of Streptococcus iniae and Vibro harveyi, especially by immersion method, can positively improve the level of digestive enzymes in Asian sea bass juveniles.

Keywords: Immersion vaccines, Injection vaccines, Digestive enzymes, Asian sea bass.