Haemato-immunological responses and effectiveness of feed-based bivalent vaccine against Streptococcus iniae and Aeromonas hydrophila infections in hybrid red tilapia (Oreochromis mossambicus × O. niloticus)

ABSTRACT

Background: Streptococcosis and Motile Aeromonad Septicemia (MAS) are important diseases of tilapia, Oreochromis spp. and causes huge economic losses in aquaculture globally. The feed-based vaccination may be an alternative to minimize major infectious diseases in tilapia. Thus, this study aims to evaluate the haemato-immunological responses and effectiveness of a newly developed feed-based killed bivalent vaccine against Streptococcus iniae and Aeromonas hydrophila in hybrid red tilapia. A total of 495 hybrid red tilapia of 61.23 ± 4.95 g were distributed into 5 groups (each with triplicate). The fish were immunized orally through bivalent (combined S. iniae and A. hydrophila) spray vaccine (BS group), bivalent formulate vaccine (BF group), monovalent S. iniae vaccine (MS group), monovalent A. hydrophila vaccine (MA group) and unvaccinated as a control group. The vaccine was orally administered on days 0, 14 and 42 applied feed-based bacterin at 5% body weight. The blood and spleen samples were collected from all groups on 7, 21 and 49 days post-vaccination, and also 96 h post-infection to assess their haemato-immune responses. Results: Compared with the unvaccinated group, leukocyte, lymphocytes, monocytes, granulocytes counts in vaccinated groups were significantly ($P < 0.05$) increased on 21, 49 days post-vaccination and also 96 h post-infection, while erythrocytes, haemoglobin and haematocrit in vaccinated groups were significantly ($P < 0.05$) enhanced only 96h post-infection. Additionally, the lysozyme and phagocytic activity and, serum antibody (IgM) were significantly higher($P < 0.05$) against S. iniae and A. hydrophila in vaccinated groups compared to the unvaccinated group in the pre- and post-infection. Results from the challenge through co-infection with S. iniae and A. hydrophila showed the relative percent survival (RPS) in BF group was 76.67 ± 4.71%, which had the capacity to induce significant protection ($P < 0.05$) compared to others groups. Conclusions: This study demonstrates the bivalent formulate (BF) group could elicit significant non-specific and specific immunological responses with higher protection in hybrid red tilapia. In addition, this newly developed feedbased bivalent vaccination can be a promising technique for effective and large scale fish immunization in the aquaculture industry.

Keyword: Haemato-immunological parameters; Feed-based; Bivalent vaccine; Hybrid red tilapia (Oreochromis mossambicus × O. niloticus)