

Palm oil-adjuvanted feed-based vaccination enhances humoral and macrophage responses of marine tilapia (*Oreochromis niloticus*) against

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Saiwany MD [\[1\]](#), [\[2\]](#); Amal, MINA (Amal, Monammad Noor Azmal) [\[1\]](#), [\[2\]](#); Zamri-Saad, M (Zamri-Saad, Mohd) [\[2\]](#); Firdaus-Nawi, M (Firdaus-Nawi, Mohd) [\[5\]](#); Salleh, A (Salleh, Annas) [\[1\]](#), [\[2\]](#)

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Abstract

This study evaluated the effect of a formalin-inactivated feed-based *Vibrio harveyi* vaccine on macrophage activities following challenge with live *Vibrio* spp. Three experimental groups, each comprising 105 marine tilapias, were established. Fish in Groups 1 and 2 were vaccinated with adjuvanted or non-adjuvanted formulations at weeks 0, 2, and 6, respectively, whereas Group 3 received PBS only. Serum samples were collected at 2-week intervals, whereas peritoneal macrophages were collected on weeks 0 (pre-vaccination) and 10 (post-vaccination). Serum IgM against *V. harveyi* and *V. alginolyticus* were measured by indirect ELISA. Cultured macrophages were exposed to *V. harveyi* and *V. alginolyticus* for 0, 30, 60, and 120 min. Following exposure, phagocytic activity, intracellular bacterial killing, and macrophage cell death were assessed. Serum IgM concentrations increased following the primary and first booster vaccinations and remained elevated up to week 4. Administration of the second booster sustained these elevated IgM levels through week 12 in vaccinated Groups 1 and 2. However, Group 1 developed significantly ($p < 0.05$) higher IgM levels against both *V. harveyi* and *V. alginolyticus* than Groups 2 and 3. Similarly, Group 1 demonstrated significantly ($p < 0.05$) higher rate of macrophage phagocytic activity than unvaccinated Group 3 at 30 min and 60 min after exposure to *V. harveyi* and *V. alginolyticus*, respectively. Group 1 also showed significantly ($p < 0.05$) higher intracellular killing of *V. harveyi* and *V. alginolyticus* than Groups 2 and 3 at 30, 60, and 120 min, but non-significant ($p > 0.05$) lower macrophage death rates at 30 min after *V. harveyi* challenge and at 60 min after *V. alginolyticus* challenge compared to Groups 2 and 3. In conclusion, the oil-adjuvanted, formalin-killed *V. harveyi* feed-based vaccine elicited effective systemic immunity, leading to enhanced macrophage-mediated phagocytosis and intracellular killing of *V. harveyi* and *V. alginolyticus* in marine tilapia, suggesting potential heterologous (cross-protective) immune responses against multiple *Vibrio* species.

Keywords

Author Keywords: [Macrophage](#); [Tilapia](#); [Vaccination](#); [Vibrio harveyi](#); [Vibrio alginolyticus](#)

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Author Information

Corresponding Address: Salleh, Annas (corresponding author)

▼ Univ Putra Malaysia, Fac Vet Med, Dept Vet Lab Diag, Upm Serdang 43400, Selangor, Malaysia

E-mail Addresses :

annas@upm.edu.my

Addresses :

- ▼ ¹ Univ Putra Malaysia, Fac Vet Med, Dept Vet Lab Diag, Upm Serdang 43400, Selangor, Malaysia
- ▼ ² Univ Putra Malaysia, Inst Biosci, Aquat Anim Hlth & Therapeut Lab, Upm Serdang 43400, Selangor, Malaysia
- ▼ ³ Univ Putra Malaysia, Fac Agr, Dept Aquaculture, Upm Serdang 43400, Selangor, Malaysia
- ▼ ⁴ Univ Putra Malaysia, Fac Sci, Dept Biol, Upm Serdang 43400, Selangor, Malaysia
- ▼ ⁵ Int Islamic Univ Malaysia, Inst Oceanog & Maritime Studies, Aquat Microbiol Res Lab, Kuantan 25200, Pahang, Malaysia

E-mail Addresses :

tilushavet@gmail.com; salwany@upm.edu.my; mnamal@upm.edu.my; firdausn@iium.edu.my; mzamri@upm.edu.my; annas@upm.edu.my

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Data will be made available on request.

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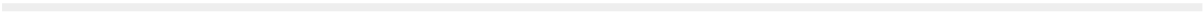
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