

Probiotic, *Lactobacillus pentosus* BD6 boost the growth and health status of white shrimp, *Litopenaeus vannamei* via oral administration

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Abstract	<p>This study aims to assess and determine the oral-administration of probiotic, <i>Lactobacillus pentosus</i> BD6 on growth performance, immunity and disease resistance of white shrimp, <i>Litopenaeus vannamei</i>. <i>Lac. pentosus</i> BD6 effectively inhibited the growth of aquatic pathogens, which was used in the test. Shrimp were fed with the control diet (without probiotic supplement) for 60 days and the probiotic-containing diets at 107, 108, 109, and 1010 cfu kg⁻¹, respectively. Shrimp fed with the diet containing probiotic at the doses of 109-10 cfu kg⁻¹ showed significant increase in growth performance as well as feed efficiency than that of the control. After a challenge test with <i>Vibrio alginolyticus</i>, shrimp fed with a probiotic diet at a dose of 1010 cfu kg⁻¹ showed a significantly lower mortality as compared to the control and that of shrimp fed the diet containing probiotic at the levels up to 107-8 cfu kg⁻¹. In addition, a therapeutic potential of <i>Lac. pentosus</i> BD6 was discovered because the cumulative mortalities of shrimp fed with probiotic and pathogen <i>V. parahaemolyticus</i> simultaneously were significantly lower when compared to control shrimp. Probiotic in diet at a dose of 109-10 cfu kg⁻¹ significantly increased PO activity of shrimp, while shrimp receiving probiotic at the doses of 108-10 cfu kg⁻¹ showed significant increase in lysozyme activity and phagocytic activity. Shrimp fed with the diet containing probiotic at the level of 1010 cfu kg⁻¹ also indicated higher gene expression of prophenoloxidase (proPO) I, but not proPO II, lipopolysaccharide and beta-1,3-glucan-binding protein and penaeidin 4. Analysis of the bacterial microbiota of the shrimp intestine revealed that oral administration of probiotic increased the relative abundance of beneficial bacteria and reduced the abundance of harmful pathogenic bacteria in the gut flora of shrimp. Despite no statistically significant difference, an analysis of microbial diversity recorded higher species richness, Shannon-Weaver diversity index and evenness in the probiotic group, compared to the control group. It was concluded that <i>Lac. pentosus</i> BD6 has great antibacterial ability against a wide range of pathogens and has therapeutic potential to reduce the mortality of shrimp infected with <i>V. parahaemolyticus</i>. Additionally, dietary <i>Lac. pentosus</i> BD6 at the level of 1010 cfu kg⁻¹ was recommended to improve growth performance, immunity and disease resistance of shrimp against <i>V. alginolyticus</i>.</p>
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