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Modulatory effect of different doses of essential oils of *Origanium vulgare* on the antioxidant, antimicrobial and immune-related genes of sea bass *Dicentrachus labrax* challenged with *Vibrio alginolyticus*

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A total 3000 pieces of sea bass (*Dicentrachus labrax*) fingerlings were stocked in a nursery earthen pond by the rate of 3000 pieces with body weight ranges between 40 to 50 grams per pieces in 1000 cubic meters and 90 fish (30×3 replicates) were stocked in aerated aquaria to assess the effects of essential oil of *Origanum vulgaris* and challenged with 0.5 ml of a virulent strain of *Vibrio algenolyticus* at 4×10^6 cells/ml administered intraperitoneally. The experiments were conducted in two phases (*In situ* phase and Aquarium phase) to evaluate the essential oils of *Origanum vulgare* at different concentrations 0.5 and 1 ml/kg feed on various antioxidants enzymes activities in liver tissue and to determine antimicrobial activity against different bacteria, fungus and yeasts and detection of gene expression of cytokine from liver as well as effect on *Vibrio algenolyticus* challenged fingerlings of sea bass. The results revealed that the essential oils of *Origanum vulgare* increases the catalase activity and severe drop of lipid peroxidation level in liver tissues compared with control group. In the liver of sea bass supplemented with essential oil of *Origanum vulgare* caused down regulation of HSP. In addition to the essential oils of *Origanum vulgare*, it has antimicrobial affects against wide range of bacterial and fungal agents of cultured fish. In conclusion the current results demonstrate the oils of *O. vulgare* (0.5 ml and 1 ml kg⁻¹) improving the fish health status and immune resistance against *Vibrio alginolyticus* infection and act as antimicrobial antioxidant.

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