



ALLIANCE™

[.https://www.globalseafood.org](https://www.globalseafood.org)Health &
Welfare

Study shows potential of a marine bivalve as a natural solution for vibriosis control in tilapia farming

23 June 2025

By Darryl Jory, Ph.D.

Incorporating *Paratapes undulata* into aquaculture feeds or water treatments can control vibriosis outbreaks in tilapia farming



Study reports the potential of the marine bivalve undulate Venus as a natural solution for vibriosis control in red tilapia aquaculture. Results suggest that *P. undulata* can be effectively incorporated into aquaculture feeds or water treatments to prevent and manage vibriosis outbreaks, and proposes this marine bivalve is a promising, natural and sustainable biocontrol agent for vibriosis in aquaculture, a novel strategy for disease management and reducing reliance on antibiotics.

The findings of a recent paper by researchers in Egypt report the marine bivalve known as undulate Venus (*Paratapes undulata*) as a promising, natural and sustainable biocontrol agent for vibriosis in aquaculture, offering a novel strategy for disease management and reducing reliance on antibiotics. The results suggest that *P. undulata* can be effectively incorporated into aquaculture feeds or water treatments to prevent and manage vibriosis outbreaks in red tilapia farming.

The **study** (<https://doi.org/10.1038/s41598-025-01026-x>),– authored by Drs. Azza SalahEldin El-Demerdash, Rehab E. Mowafy, Hend M. Megahed, Sally H. Abou Khadra and Mohamed A. Bakry (Agricultural Research Center, Animal Health Research Institute, Egypt); and Dr. Ahmed Hussien Moustafa (Zagazig University, Egypt) – discusses the pioneering use of *P. undulata*, a locally abundant bivalve in Egypt's marine coastal areas, as a biocontrol agent against *Vibrio alginolyticus* in aquaculture. The species' profile of bioactive compounds is examined in relation to its possible antimicrobial properties.

“Our research unequivocally establishes the remarkable potential of *P. undulata* as a natural and sustainable solution for vibriosis control in red tilapia aquaculture. It not only achieved significant improvements in fish growth (up to 362 percent) and drastically reduced mortality (by up to 100 percent), but also offers a vital, antibiotic-free strategy to combat virulent, drug-resistant *V. alginolyticus* outbreaks,” Dr. Azza SalahEldin El-Demerdash, corresponding author of the study, told the *Advocate*.

Vibriosis is a significant global threat to aquaculture and is mainly caused by bacterial pathogens from the genus *Vibrio*, with *V. alginolyticus* a major contributor. This bacterium poses a serious **threat to tilapia aquaculture** (<https://doi.org/10.3389/fmicb.2022.904815>) worldwide, causing significant economic losses due to high mortality rates, and reduced growth and feed conversion efficiency. *V. alginolyticus* infections weaken the tilapia's immune system and increase susceptibility to secondary infections and also present a zoonotic (infectious disease of humans triggered by a pathogen that can jump from a non-human vertebrate to a human) risk, potentially **affecting human health** (<https://doi.org/10.1038/s41598-024-58349-4>) through the consumption of contaminated seafood.



(<https://info.globalseafood.org/get-certified>).

This is the first study utilizing *P. undulata* as a biocontrol agent against *V. alginolyticus* in red tilapia. It provides fresh perspectives on sustainable management of vibriosis by assessing antimicrobial susceptibility across various isolates of this bacterium and numerous antimicrobial resistance indices, along with a challenge study conducted in an aquaria system with live bivalves and red tilapia. The challenge study assessed how dietary inclusion of *P. undulata* influenced red tilapia in terms of growth performance, mortality rates, bacterial load, hematological parameters, biochemical markers, gene expression, clinical observations and histopathological results.



Nanoparticles are a promising alternative for the management and mitigation of vibriosis in aquaculture

Nanoparticles may have potential as antibacterial drugs for Vibriosis control through their various mechanisms of action against bacteria.



Global Seafood Alliance

P. undulata is a marine bivalve known to produce various antimicrobial peptides, making it a potential candidate for developing **natural antimicrobial agents** (<https://doi.org/10.1201/9781351133395>). Results showed that incorporating this bivalve into the diet substantially improved growth performance in red tilapia subjected to a *V. alginolyticus* challenge, highlighted by increases in final weight, weight gain, specific growth rate and a better feed conversion ratio (FCR) when contrasted with the infected control group. Remarkably, these beneficial growth metrics were maintained, even in animals experimentally infected with *V. alginolyticus*.

After the challenge with the bacterium, the cumulative mortality rates were considerably lower in the groups treated with *P. undulata* compared to the infected control group (G2). The peak mortality occurred on the third day following infection in the diseased control group, after which it gradually reduced. Conversely, there were no deaths recorded in the control group (G1) or the bivalve-treated control group (G3) (Fig. 1).

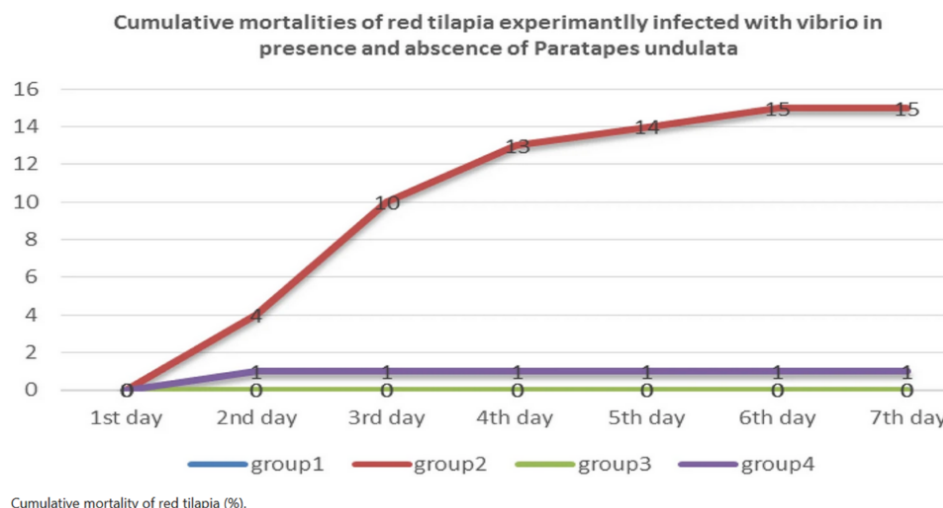


Fig.1: Cumulative mortalities of red tilapia experimentally infected with *V. alginolyticus* in the presence and absence of *P. undulata*. Adapted from the original.

Fish of the *P. undulata* treatment exhibited significantly reduced clinical signs and gross lesions compared to the infected control group, suggesting protective effects against *V. alginolyticus* infection. The **reduced severity** (<https://doi.org/10.3390/ani13040746>) of clinical signs and lesions in the treated group may be attributed to the antimicrobial, antioxidant and immunomodulatory properties of the treatment.

The biochemical and molecular results from this research offer compelling support for the protective role of *P. undulata* against infections caused by *V. alginolyticus*. Use of *P. undulata* significantly improved antioxidant levels and decreased enzyme activity in the liver and kidneys, reaffirming its protective benefits against infection.

The results also indicated that the addition of *P. undulata* successfully alleviated the hematological issues triggered by *V. alginolyticus* in red tilapia. The detected enhancements in red blood cell metrics – reflecting better oxygen transport and a decrease in white blood cell count that points to a regulated inflammatory response – highlight its potential as a dietary addition. These findings are consistent with earlier research indicating that dietary incorporation of marine bivalves can **improve blood parameters** (<https://doi.org/10.3389/fphys.2018.01456>) in stressed fish.

In addition, *P. undulata* dietary supplementation appeared to effectively modulate the immune response in red tilapia challenged with *V. alginolyticus*. Its infection elicited a **robust immune response** (<https://doi.org/10.3390/antiox11081523>) and prevented excessive inflammation. These immunomodulatory effects are likely mediated by the synergistic action of various bioactive compounds in *P. undulata*, including sterols, fatty acids and polysaccharides, which are known to influence cytokine production and immune cell function.

“Beyond impressive growth and survival rates, *P. undulata* effectively modulates the fish’s immune response and directly inhibits *V. alginolyticus* virulence at the genetic level. These findings, supported by the identification of key bioactive compounds, highlight *P. undulata* as a promising and eco-friendly additive for effective disease management in aquaculture feeds or water treatments,” Dr. El-Demerdash told the *Advocate*.

Finally, antibiotic susceptibility testing revealed a concerning prevalence of extreme drug-resistant *V. alginolyticus* isolates, with one-third exhibiting resistance to multiple antibiotic classes. The emergence of these strains underscores the urgent need for alternative therapeutic strategies. This high level of antibiotic resistance poses a **significant public health threat** (<https://doi.org/10.1016/j.jjantimicag.2018.03.010>), limiting treatment options for both human and animal infections and contributing to the global spread of antibiotic resistance.

“This study definitively demonstrates the significant potential of *P. undulata* as a natural and sustainable solution for mitigating *Vibrio alginolyticus* infections in aquaculture. The observed reduction in mortality, coupled with enhanced fish health parameters in an open culture system, strongly supports its practical application,” concluded the authors. “Furthermore, the effective modulation of the host’s immune response, characterized by reduced oxidative stress and inflammation, highlights its multifaceted protective capabilities. The implications of these findings extend beyond disease management. *P. undulata* offers a promising avenue for antibiotic-free aquaculture practices, addressing the growing concerns surrounding antibiotic resistance and environmental sustainability. By providing a natural alternative to traditional antibiotics, it contributes to healthier ecosystems and safer seafood production.”

Author



DARRYL JORY, PH.D.

Editor Emeritus

darryl.jory@globalseafood.org (<mailto:darryl.jory@globalseafood.org>)

Copyright © 2025 Global Seafood Alliance

All rights reserved.