Translucent Post-Larval Disease (TPD): An Emerging Threat to Shrimp Hatcheries and Sustainable Aquaculture

Kalaria Kishan Kishorchandra[1]*, Ngairangbam Sushila[1] and Mihir Rameshbhai Patel[1]

[1]*College of Fisheries Science, Kamdhenu University, Navsari, Gujarat (396450), India*

Corresponding Author
Kalaria Kishan Kishorchandra
Email: thekishan.22@gmail.com

OPEN ACCESS

Keywords

Translucent Post-Larval Disease (TPD); *Penaeus vannamei; Vibrio parahaemolyticus*; Hatchery biosecurity; Molecular diagnosis; Shrimp health

How to cite this article:

Kishorchandra, K. K., Sushila, N. and Patel. M. R. 2026. Translucent Post-Larval Disease (TPD): An Emerging Threat to Shrimp Hatcheries and Sustainable Aquaculture. *Vigyan Varta* 7 (09): 34-37.

ABSTRACT

Translucent Post-Larval Disease (TPD) is an emerging bacterial disease that poses a significant threat to the hatchery production of Pacific white shrimp (*Penaeus vannamei*). The disease mainly affects early post-larval stages (PL2–PL7) and is characterized by a translucent body, pale hepatopancreas, empty gut, reduced feeding, and rapid mortality. Virulent strains of *Vibrio parahaemolyticus* carrying the aerolysin toxin gene are considered the primary causative agents, while Baishivirus has also been implicated in some outbreaks. Although no confirmed large-scale outbreaks have been reported in India, the risk of disease introduction necessitates continuous surveillance and strong hatchery biosecurity. Early diagnosis using molecular techniques and the adoption of preventive management practices are essential for minimizing disease outbreaks and ensuring sustainable shrimp seed production.

INTRODUCTION:

The culture of Pacific white shrimp (*Penaeus vannamei*) has played a pivotal role in the rapid expansion of the global shrimp aquaculture sector over the past two decades. Despite significant advancements in farming technologies and

management practices, the sustainability of shrimp production continues to be challenged by the emergence of infectious diseases. Among these, bacterial diseases caused by *Vibrio* species remain a major concern due to their widespread distribution and ability to cause severe economic losses. In recent years, Translucent Post-Larval Disease (TPD), also referred to as Highly Lethal Vibrio Disease (HLVD), has emerged as a serious threat to shrimp hatcheries. First reported from China in 2020 and subsequently from Vietnam, the disease is characterized by rapid onset, high mortality, and significant losses in post-larval production (Zou *et al*., 2020; Shinn *et al*., 2024). TPD primarily affects early post-larval stages, where outbreaks can result in near-complete mortality within a short period, severely impacting seed availability for grow-out farming. Given the critical role of healthy post-larvae in determining the success of shrimp culture operations, a comprehensive understanding of TPD, including its etiology, diagnosis, epidemiology and preventive measures, is essential for strengthening hatchery biosecurity and ensuring sustainable shrimp production.

Vibrio Infections in Shrimp Production

Members of the genus *Vibrio* are ubiquitous inhabitants of marine and brackish water ecosystems and form a natural component of the microbial community in aquaculture environments. Although many *Vibrio* species exist as harmless commensals, certain pathogenic strains can become significant disease-causing agents when environmental conditions favour their proliferation or when shrimp are subjected to stress. Consequently, vibriosis remains one of the most important bacterial health challenges in shrimp aquaculture worldwide. In hatchery and grow-out systems, pathogenic *Vibrio* spp. can colonize water, sediment, biofilms, live feeds and culture equipment, creating persistent reservoirs of infection. These bacteria may gain entry into production systems through several pathways, including infected broodstock, contaminated nauplii and post-larvae, untreated water sources, microalgal cultures, *Artemia* and other live feeds, as well as through water and air distribution systems. In addition, contaminated equipment, personnel and biofilms formed within tanks and pipelines can facilitate the introduction and dissemination of these pathogens. Once established, pathogenic *Vibrio* populations can multiply rapidly, increasing the risk of disease outbreaks and significant production losses (Shinn *et al*., 2024). Therefore, effective biosecurity, routine monitoring, and proper hatchery management practices are critical for minimizing the risk of Vibrio-associated diseases and maintaining shrimp health.

Translucent Post-Larval Disease (TPD)

Translucent Post-Larval Disease (TPD) is a highly infectious bacterial disease affecting young post-larvae of Pacific white shrimp (*Penaeus vannamei*). The disease derives its name from the characteristic translucent or glass-like appearance of infected shrimp, resulting from the loss of normal pigmentation in the hepatopancreas and digestive tract. Affected post-larvae typically exhibit a pale, colourless hepatopancreas, an empty gut, reduced feeding activity and lethargic behaviour. TPD mainly affects post-larvae between PL2 and PL7 stages, although other early developmental stages may also be susceptible (Zou *et al*., 2020; Shinn *et al*., 2024). The disease is primarily associated with virulent strains of *Vibrio parahaemolyticus* carrying the aerolysin toxin gene, which produces toxins capable of damaging the hepatopancreas and digestive tissues (Zou *et al*., 2020). Recent studies have also suggested the possible involvement of Baishivirus in certain outbreaks, indicating that multiple pathogens may contribute to TPD-like syndromes (Xu *et al*., 2023). The disease progresses rapidly and can cause mortality

rates of 80–100% within 24–48 hours after the onset of clinical signs, with most outbreaks occurring within three to five days after stocking (Zou *et al*., 2020; Shinn *et al*., 2024).

Clinical Signs and Disease Characteristics

Translucent Post-Larval Disease (TPD) is characterized by distinct clinical signs that are readily observable in affected shrimp post-larvae. The most prominent feature is the development of a translucent or glass-like body appearance accompanied by a pale, colourless hepatopancreas and an empty digestive tract (Zou *et al*., 2020; Srisala *et al*., 2025; Shinn *et al*., 2024). Infected post-larvae also exhibit reduced pigmentation, decreased feed consumption, sluggish swimming behaviour, weak responses to external stimuli and a tendency to accumulate at the bottom of rearing tanks (Zou *et al*., 2020; Shinn *et al*., 2024). As the disease progresses, affected larvae become increasingly lethargic and experience rapid mortality, often within a short period after the appearance of clinical signs. Although these manifestations are highly suggestive of TPD, similar symptoms may occur in other bacterial and viral diseases; therefore, laboratory confirmation is essential for accurate diagnosis.

Figure 1 - TPD-affected post-larvae, particularly during the PL2–PL4 stages, commonly show a glass-like body, a colourless hepatopancreas, and an empty gut.

Current Status of TPD in India

Translucent Post-Larval Disease (TPD) has emerged as a significant threat to shrimp hatchery production in several Asian countries, particularly China and Vietnam, where severe outbreaks have resulted in substantial economic losses. In India, no large-scale confirmed outbreaks have been reported to date; however, the disease remains a matter of concern due to its devastating impact on shrimp seed production and the widespread presence of pathogenic *Vibrio* species in aquaculture systems. Reports of post-larval mortalities exhibiting clinical signs resembling TPD in some shrimp-producing regions, especially Andhra Pradesh, prompted increased vigilance among farmers, researchers and regulatory agencies. As a precautionary measure, surveillance and diagnostic capabilities have been strengthened through training programmes and laboratory preparedness initiatives. Continuous disease monitoring, rapid molecular diagnostics and strict implementation of biosecurity protocols are essential to prevent the introduction and establishment of TPD in Indian shrimp hatcheries and to safeguard the sustainability of the country's shrimp aquaculture industry.

Diagnosis of Translucent Post-Larval Disease (TPD)

Accurate diagnosis of Translucent Post-Larval Disease (TPD) is essential because several shrimp diseases can produce similar clinical signs. Initial suspicion of TPD arises when post-larvae, particularly at the PL2–PL4 stages, exhibit a translucent or glass-like body appearance, a pale or colourless hepatopancreas, an empty digestive tract, reduced feeding activity, sluggish swimming behaviour, and rapid mortality (Zou *et al*., 2020; Shinn *et al*., 2024). However, visual observation alone is not sufficient for confirmation. For laboratory diagnosis, Molecular diagnostic techniques, especially Polymerase Chain Reaction (PCR) and Real-Time PCR, are currently the most reliable methods for detecting TPD-associated pathogens. Diagnostic laboratories typically

screen for the thermolabile hemolysin (ldh) gene or other toxin-related genes associated with pathogenic *Vibrio parahaemolyticus* strains responsible for TPD. In cases where these tests are negative, screening for Baishivirus and other potential pathogens may be necessary (Xu *et al*., 2023). Additionally, bacterial isolation on selective media, followed by biochemical and molecular characterization, can help identify the causative *Vibrio* strains. Histopathological examination of affected post-larvae may reveal degeneration and necrosis of the hepatopancreas and digestive tissues, providing further evidence of infection (Srisala *et al*., 2025). Therefore, a combination of clinical observation, molecular diagnostics, microbiological analysis, and histopathology provides the most accurate approach for confirming TPD and differentiating it from other shrimp diseases.

Control and Prevention of Translucent Post-Larval Disease (TPD)

As there is currently no specific treatment available for Translucent Post-Larval Disease (TPD), prevention remains the most effective strategy for managing the disease. Strict biosecurity measures should be implemented throughout the hatchery to prevent the introduction and spread of pathogenic *Vibrio* species. Incoming water should be properly treated using methods such as filtration, UV irradiation, ozonation, or chlorination before use. Routine cleaning and disinfection of tanks, pipelines, and equipment help prevent the formation of biofilms that can harbor and spread pathogenic *Vibrio* bacteria within hatchery systems. The use of healthy, pathogen-screened broodstock and biosecure live feeds can further reduce the risk of disease introduction. Maintaining optimal water quality, avoiding overstocking, and minimizing environmental stress help improve the resistance of shrimp post-larvae to infections. The application of scientifically validated probiotics can also support a balanced microbial community and suppress the growth of harmful bacteria. Routine health monitoring and molecular screening of post-larvae for TPD and other major pathogens enable early detection and timely intervention. In the event of a suspected outbreak, affected tanks should be immediately isolated, infected stocks removed if necessary, and biosecurity measures intensified to prevent disease spread to other production units. Through a combination of good hatchery management, regular surveillance, and strong biosecurity practices, the risk of TPD outbreaks can be significantly reduced (Shinn *et al*., 2024).

REFERENCES

Shinn, A., Wongwaradechkul, R., Piazza, J., Decock, B., Raynaud, T., Medina, A., & Léger, E. (2024). Translucent post larvae disease-a deadly Vibrio infection affecting farmed shrimp.

Srisala, J., Sanguanrut, P., Powtongsook, S., Khemayan, K., Sritunyalucksana, K., & Flegel, T. W. (2025). Novel midgut smooth muscle necrosis (MSMN) in translucent or glass post-larvae of whiteleg shrimp. *Scientific Reports*, *15*(1), 35544.

Xu L., *et al*. Identification of Baishivirus associated with Translucent Post-Larval Disease in *Penaeus vannamei*. 2023.

Zou, Y., Xie, G., Jia, T., Xu, T., Wang, C., Wan, X., ... & Zhang, Q. (2020). Determination of the infectious agent of translucent post-larva disease (TPD) in *Penaeus vannamei*. *Pathogens*, *9*(9), 741.