Hepatitis A and Shellfish: Understanding Zoonotic Risks

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OPEN ACCESS

Keywords

HAV, Filter-feeding, Outbreaks, Vaccination

How to cite this article:

Santhiya, V., Porselvan, S., Saravanan, S. and Kaviarasu, D. 2025. Hepatitis A and Shellfish: Understanding Zoonotic Risks. *Vigyan Varta* 6 (5): 46-49.

ABSTRACT

The filter-feeding nature of shellfish like oysters and clams creates a significant health risk for hepatitis A virus (HAV) transmission. These bivalves can concentrate viruses from polluted waters, particularly in areas exposed to sewage discharge. When people consume raw or partially cooked shellfish from contaminated sources, they risk contracting HAV, which spreads through the fecal-oral route and targets the liver. Outbreaks linked to contaminated shellfish have been documented worldwide, highlighting the virus's resilience within shellfish tissues, where it can persist even after depuration. Effective preventive measures include thorough cooking, maintaining good hygiene, monitoring water quality, vaccination, and improved sewage treatment to reduce viral contamination in coastal waters. To protect public health, it is crucial to better understand how HAV spreads through shellfish and implement stronger food safety protocols, especially in areas with limited disease tracking.

INTRODUCTION

Contamination of shellfish like oysters, clams, and mussels, which are cultivated in coastal waters, by microorganisms harmful to humans is a serious public health concern worldwide. Many commercial shellfish species inhabit estuaries and shallow waters and are often contaminated by human sewage or runoff from

coastal waters. Thus, they pose a risk of illness when consumed raw or undercooked (Sincero *et al*., 2006). Several human viruses transmitted via the fecal-oral route have been linked to shellfish. These viruses may pose a health risk when consumed, potentially leading to gastroenteric illnesses. Enteric viruses are more resistant to inactivation in water sources and are removed slowly, or not at all, from bivalves by depuration process. Shellfish present a particularly high risk for hepatitis A transmission due to their filter-feeding behaviour, which concentrates viruses within their edible tissues during feeding (Lees, 2000).

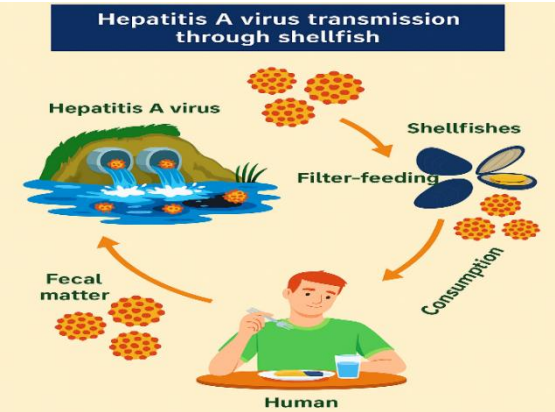
Overview on Hepatitis A Virus (HAV)

HAV is a single stranded, non-enveloped RNA virus of the genus *Hepatovirus* belonging to the family *Picornaviridae*. HAV causes acute viral hepatitis in humans. It is a highly contagious virus that infects the liver, leading to symptoms like jaundice, fatigue, and gastrointestinal discomfort. Unlike hepatitis B and C, HAV does not lead to chronic liver disease but can cause severe acute symptoms in some cases, particularly among older adults. It primarily spreads through the fecal-oral route, which can occur via contaminated food or water, or through direct person-to-person contact (Bellou *et al*., 2013).

HAV transmission Through Shellfish

Filter-feeding shellfish consume a large amount of water to extract their food, filtering out microscopic particles, including viruses. When shellfish are harvested from polluted waters, they may carry HAV, particularly if the water has been contaminated with human sewage. Studies have found that shellfish grown near wastewater discharge areas are especially at risk, with the potential for bioaccumulating the virus in their tissues.

Infected individuals who do not practice good hygiene can also contaminate shellfish during handling. The key identified sources of foodborne hepatitis A are shellfish, vegetables, and fruits, with consumption of shellfish responsible for approximately 50% of these cases. Notably, outbreaks of HAV linked to shellfish have been reported globally. For example, the first recorded outbreak of HAV linked to shellfish occurred in Sweden in 1955, affecting 629 people who had consumed raw oysters (Roos, 1956). Another major outbreak happened in Shanghai, China, in 1987, involving 3,00,000 cases primarily spread through contaminated clams and subsequent person-to-person transmission (Halliday *et al*., 1991). In May 2024, an outbreak of hepatitis A in France was associated with the consumption of shellfish harvested from the Calvados region, resulting in 16 confirmed cases. Similarly, in October 2024, scientific assessments in the Philippines highlighted the continued public health risk posed by hepatitis A virus transmission through shellfish collected from contaminated aquatic environments.



Studies have shown that HAV can persist in shellfish for extended periods, even after depuration- a process intended to cleanse shellfish of contaminants. The virus's resilience is further supported by the high lipid and protein content of shellfish tissues, which protects hepatitis A virus (HAV) from many chemical and physical treatments, including the post-harvest depuration processes used in some countries. Hence, HAV can remain

viable in oysters for weeks, making it a persistent threat in areas with inadequate sanitation practices.

Symptoms of HAV Infection

In humans, symptoms of HAV typically appear 15 to 50 days after exposure and can include: fatigue, abdominal pain, nausea, loss of appetite, vomiting, fever, and jaundice (yellowing of the skin and eyes). While many infections are mild or asymptomatic, HAV can lead to severe illness and complications in some individuals, particularly those with pre-existing liver conditions.

Prevention Strategies

Thoroughly cooking shellfish to at least 145°F or ~63°C kills the virus and prevents infection. Proper handwashing by food handlers and consumers is crucial in preventing contamination. Regular surveillance of harvesting waters for indicators of fecal contamination helps ensure that shellfish are safe for consumption. Vaccination against HAV is recommended for individuals at higher risk, including those who frequently consume raw or undercooked shellfish. HAV also demonstrates environmental stability, surviving for over a month in seawater by remaining in the water column, binding to particulate matter, or accumulating in sediments, increasing the likelihood of shellfish contamination. However, effective sewage treatment can significantly reduce the release of virus into coastal waters.

CONCLUSION

Hepatitis A remains a significant public health concern associated with shellfish consumption. Despite these risks, the incidence of shellfish-borne hepatitis A is likely underreported due to limited surveillance, especially in developing countries where infection is common and often asymptomatic in young people. Although shellfish are not natural reservoirs of HAV, their ability to bioaccumulate human viruses from contaminated environments makes them a significant vehicle for zoonotic transmission. In cases of sporadic HAV, accurately tracing the source to shellfish can be difficult in the absence of food samples for testing, leading to further underestimation in surveillance data. Outbreaks, when reported, often involve large case numbers, partly due to the virus's long incubation period of 2 to 6 weeks. Hence, understanding the transmission pathways and implementing effective prevention strategies are essential for reducing the incidence of this disease. As awareness grows about food safety practices and the importance of proper sanitation in harvesting areas, the risks associated with hepatitis A from shellfish can be mitigated. A coordinated effort between regulatory authorities, aquaculture producers, and consumers is essential to reduce the public health risks associated with hepatitis A in shellfish

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