

V. CHOLERAЕ AND MARINE PRODUCTS

T. S. GOPALAKRISHNA IYER and P. R. G. VARMA

Central Institute of Fisheries Technology, Cochin-682 029

ABOUT VIBRIO CHOLERAЕ

CHOLERA vibrios are shaped like a comma or a curved rod measuring 1 to 5 micron in length and 0.3 to 0.6 micron in breadth. They are actively motile, monotrichous, non-sporeforming, non-capsulated and Gram-negative. Cholera vibrios are aerobic and the optimum temperature for growth is 37°C. The organism will grow well on alkaline media at pH 7.6 to 8.0 and on solid media the colonies are transparent.

The cholera vibrios are transmitted from sick persons and carriers by food, water, flies and contaminated hands. Via mouth, the organisms gain entry to the small intestine where the alkaline medium and an abundance of products of protein catabolism furnish favourable conditions for their multiplication. The organisms after passing through the stomach reach the small intestine. They multiply in the small bowel and produce an exotoxin which acts upon the mucosal cells of the small bowel causing them to secrete large quantities of isotonic fluid. This rapid gastrointestinal loss of isotonic fluid is responsible for all the clinical manifestations of the disease.

SEAFOOD - RELATED OUTBREAKS OF CHOLERA

An explosive outbreak of *V. cholerae* El Tor has been reported in Philippines

during 1961 and 1962. The initial infection was mainly from shrimps that were consumed raw. In 1969, another outbreak occurred in Malaysia. El Tor and non-agglutinating (NAG) strains were isolated from water and shell fish. A cholera epidemic caused by El Tor biotype began in Naples in 1973 and resulted in 25 deaths among 278 bacteriologically confirmed cases. The suspected vehicle of transmission was raw seafoods particularly mussels washed with dockside sea water contaminated with *V. cholerae*. One year later, 48 deaths, on consumption of shell fishes, occurred in Portugal and the causative organism was *V. cholera* biotype El Tor. Forty two per cent of the shell fish samples were found to be infected with *V. cholerae*. During the same period, six cases of cholera occurred in Guam and were associated with home preserved fish. In the United States, the first case of cholerae since 1911 was reported in Texas in 1973. Although the source of infection was undetermined, the individuals had consumed raw oysters. In 1977, a similar case occurred in Alabama in an individual who had eaten large quantities of raw oysters. A cholera outbreak transmitted through boiled crab meat has been reported in Louisiana in 1978. In a Food and Drug Administration (FDA) investigation, samples for blue crab from suspected areas revealed

numerous non-agglutinable strains of *V. cholerae*.

Thus, it is clear that mostly shell fishes and crustaceans are involved in cholerae outbreaks but a fin fish was incriminated in the Guam outbreak. In the Eastern Hemisphere cholera has usually infected impoverished people who live in unsanitary conditions. However, in the West, cholera often occurs among the middle class and is usually more severe in individuals with gastric disorders.

SURVIVAL OF *V. CHOLARAE* IN SEAFOODS AND ENVIRONMENTS

The survival of *V. cholerae* under various environmental conditions has been investigated by many workers. As early as 1959, the survival of *V. cholerae* in sea water has been demonstrated. In general, survival was enhanced by intermediate salinities, lower temperature, high organic content, neutral pH, dark storage and absence of competing microflora in the substrate. Survival time of the organism has been reported to be 47 days in unsterilized bay water compared to 7 days for ocean water. But, survival for more than 285 days has been observed both in ocean and bay water sterilized before being inoculated with *V. cholerae*.

Survival of *V. cholerae* in seafoods has also been investigated. Japanese workers have demonstrated uptake of *V. cholerae* by oysters and clams kept in cholerae-polluted sea water. The vibrios entered the gastro-intestinal tract of the shell fish and survived for 1.5 months at 0 to 5°C and 15-20 days at 22°C. In oysters smeared with *V. cholerae* and stored at 20°C, the number of organisms first decreased, then increased with the maximum number occurring after 68 hours. A gradual decrease followed and most of

the vibrios disappeared by 171 hours. The survival period of the vibrio increased to about 20 days in oysters and clams that had been sterilized or boiled before contamination. *V. cholerae* survived only for a few days in fish stored at room temperature but persisted for more than 3 weeks when refrigerated. Survival of the vibrio for 198 days in "sea salt solution" has been reported; again, at lower temperatures there is extended survival. El Tor vibrios survived for more than a month in various foodstuffs frozen at -20°C and much longer in foods frozen at -72°C.

There are also reports that, in summer months *V. cholerae* are also associated with zooplankton and that chitinase activity in vibrios plays a role in this association. The chitinase activity may increase the affinity to crustacea, thus explaining why *V. cholerae*, a chitin digester, is found more frequently in crabs and shrimps than other seafoods.

It is thus clear that the sea water and seafoods are sometimes contaminated with *V. cholerae* and that the organisms can survive in these substrates for a pretty long time. Therefore, considerable stress has to be given environmental hygiene and sanitation related to fish processing factories.

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Reference:

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