



Vibrio Bacteria in Seafoods

Food microbiologists all over the world have been concerned with the presence of *Vibrio parahaemolyticus*, a marine vibrio (bacteria) in seafoods. This vibrio causes gastroenteritis in man. Since 1982 we have been investigating *V. parahaemolyticus* around Mangalore, India, where it appears to be very widely distributed in marine and estuarine fish and shellfish. The levels observed were generally low (100 or less per gram of fish) and incidence of the vibrio was not related to fecal coliform counts indicating that this organism occurs naturally in the aquatic environment.

Although raw shrimp might sometimes harbor the vibrio at levels around 100/g, shrimp processors around Mangalore are able to prepare a frozen product carrying this organism within the limits of 100/g suggested by the International Commission on Microbial Specifications for Foods (ICMSF). Fish market environs like drain water and bird droppings have been observed to harbor this organism and they might be a source of contamination for products sold there. Even some samples of dried fish sold in the same environ as wet fish have been found to harbor *V. parahaemolyticus*. But in laboratory studies, survival of the organisms in the surface of dried fish appears to be less than four hours.

This vibrio has been observed to survive in processed shrimp stored in a refrigerator for up to 7-10 days. No significant difference has been observed between headless-shell-on (HS) and

peeled and undevised (PUD) shrimp. The organism can survive the process of cold smoking and freezing. In fish preparations like fish curry and fish fry contaminated post-cooking, the vibrio had been observed to survive for 24 hours at ambient temperature without declining in numbers while in shrimp curry and shrimp fry, the number increased by about two orders of magnitude in 24 hours at ambient temperature.

Dip treatment of fish in various preservatives like potassium sorbate, ethyl and propyl paraben, EDTA, etc., did not eliminate the organism; vibrio has survived in treated fish for up to five days in a refrigerator.

V. parahaemolyticus can survive in filtered seawater for more than 12 days at ambient temperature. No change in its virulence as shown by its hemolytic activity was detected during survival in seawater or estuarine water suggesting that the aquatic environment may not be applying any selective pressure on hemolytic strains. In clams held live in

the laboratory, *V. parahaemolyticus* has survived for up to six weeks and no significant difference between hemolytic and nonhemolytic strains could be observed with respect to survival in association with clams. Survival in freshwater was very poor.

Strains of *V. parahaemolyticus* associated with gastroenteritis have been reported to produce a hemolysin that causes lysis of human and rabbit erythrocytes. Experiments show that the role of hemolysin in the virulence of *V. parahaemolyticus* is indirect in that it helps the organism to proliferate in the host body by making iron available from lysed erythrocytes in an environment where iron is the limiting factor for the growth of pathogens. The lethal dose of nonhemolytic vibrio strains to mice can be lowered by supplementing the inoculum with lysed red blood cells or iron. Even in rabbit serum, the vibrio is unable to multiply unless provided with iron. When washed red blood cells are added to serum, hemolytic vibrio strains have a clear advantage over nonhemolytic ones.

No multiple drug resistance was observed in any of the more than 2,000 strains tested. About 2% of the *V. parahaemolyticus* strains isolated from the natural environment are resistant against the vibriostatic agent 0/129 (2, 4 diamano, 6-7 diisopropylpteridine). 0/129 is a chemical which inhibits vibrios. Because it does not inhibit other Gram-negative bacteria, it is used in tests to identify vibrios. ●

I. KARUNASAGAR
Department of Fishery Microbiology
College of Fisheries
Mangalore - 575002
India