

VIBRIO PARAHAEMOLYTICUS

THE ORGANISM/TOXIN

A marine *Vibrio* normally associated with food poisonings involving seafood consumption. It is a major cause of food poisoning in Asian countries. Certain strains (Kanagawa phenomenon-positive, KP+) are primarily involved with human disease.

GROWTH AND ITS CONTROL

Growth:

Temperature: Range 5-43°C, optimum 37°C. Growth is very rapid under optimum conditions.

pH: Optimum 7.8-8.6. Range 4.8-11. Minimum pH for growth decreases as the incubation temperature increases towards the optimum.

Growth was inhibited in the presence of 0.1% acetic acid (pH 5.1).

Atmosphere: Can grow in the presence or absence of oxygen, but grows optimally under aerobic conditions.

Water activity: Grows in NaCl concentrations from 0.5-10%. Optimum = 3%. a_w range is 0.940 to 0.996, with an optimum of 0.980.

Survival:

Temperature: Survives freezing, although number reduced 10-100 fold.

Inactivation (CCPs and Hurdles):

Temperature: The organism dies at temperatures of 0-5°C. Cooking to an internal temperature of 65°C effectively inactivates this organism. D time at 65°C < 1 min, at 55°C 2.5 min.

A low temperature pasteurisation of 10 minutes at 50°C has been suggested for shellstock oysters.

pH: Thermal D time increases as pH increases from 5.0 to 8.0.

Water activity: Very sensitive to drying. Fresh water inactivates the organism.

Preservatives: (NB: Some of the preservatives discussed here may not be permitted in New Zealand). The organism is highly sensitive to 50 ppm butylated hydroxyanisole.

It is inhibited by 0.1% sorbic acid.

Sanitisers/Disinfectants: D time of 15 seconds when exposed to chlorine or iodophor at 13 ppm.

Radiation: A dose of 3 kGy has been recommended for the elimination of vibrios from frozen shrimps. Quite sensitive to irradiation; D value of <0.1 kGy in fish at 24°C.

Depuration: Not effective at removing vibrios from shellfish.

THE ILLNESS

Incubation: 4-74 hours, mean 12-46 hours.

Symptoms: Abdominal cramps and watery

diarrhoea. Sometimes nausea, vomiting and fever. Symptoms last from 1 to 7 days, occasionally longer. Mean duration 2.5 days. Hospitalisation is required in approximately 7% of cases. Usually self-limiting. Extraintestinal infections can occur.

Condition: Primarily gastrointestinal infection.

Toxins: The KP+ factor is a haemolysin. Expression of this haemolysin seems to be responsible for the symptoms. However other virulence factors, such as a shiga-like toxin are also likely to be involved.

At Risk Groups: No at risk groups reported for gastroenteritis.

Long Term Effects: Reactive arthritis has been reported.

Dose: Ingestion of 2×10^5 - 3×10^7 cells is required to cause disease in healthy adults, but it may be lower in the presence of antacids or food.

NZ Incidence: Not a notifiable disease in New Zealand.

Treatment: Gastroenteritis is usually self-limiting. Appropriate antibiotics may reduce symptoms.

SOURCES

Human: Asymptomatic carriers are known to occur. Carriers act as a source of environmental contamination.

Animal: Occurs in marine animals including mammals, fish, shellfish, crustaceans and plankton.

Food: Foods of marine origin may harbour this organism. Levels may approach 10^3 /g in fresh seafood and may be greater in the warmer months, but are more typically present at around 10/g. Large proportions (60-100%) of seafood samples in the USA were found to contain the organism.

Environment: A normal inhabitant of the marine environment. The presence of the organism in the environment is heavily influenced by the season, occurring at the highest levels in the warmer months. However, typically > 99% of isolates from seawater are not of the human pathogenic kind (they are KP-).

Transmission Routes: Usually via temperature abused seafood.

OUTBREAKS AND INCIDENTS

Overseas Outbreaks: Seafoods are the food group most often associated with outbreaks.

Shrimps: 1,133 cases of 1,700 exposed. Control point failure: post cooking contamination, temperature abuse.

Raw and Cooked Oysters: 12% of attendees at a conference. Control point failure: not identified.

Raw Oysters: 209 cases. Control point failure: temperature.
harvesting oysters from water with an elevated

ADEQUATE PROCESSING GUIDELINES

N.B. These guidelines have been derived from published information. Industry is advised to ensure that processing steps they are using are adequate to meet their particular food safety objectives.

| Cook to: | Internal temperature reached | Time |
|---|------------------------------|--------|
| Seafood | 65°C | 1 min |
| Oysters | 50°C | 10 min |
| Hold foods at | ≤ 5°C or ≥ 60°C | |
| Reduce pH of seafood to ≤ 4.8 | | |
| Ensure shellfish are harvested from approved shellfish gathering waters | | |
| Avoid cross contamination from raw to cooked seafoods | | |

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