Foodborne gastroenteritis caused by *Vibrio cholera, Vibrio parahaemolyticus, Campylobacter*

Foodborne gastroenteritis caused by *Vibrio cholera*

Characters

- *Vibrio cholera* is a causative organism of human cholera due to the consumption of contaminated food/water containing viable cells. V. cholera is a Gram negative, non spore forming, facultatively anaerobic, curved rods belonging to the family enterobacteriacea.
- The epidemic/pandemic cholera is caused by V. cholera serovar "O" Group 1 (O1) and consists of 2 biotypes Viz. classical and El-Tor based on biochemical tests. These have ability to agglutinate O1 antiserum. Strains that do not aglutinate in O1 antiserum are referred to as non O1 or non-agglutinating vibrios (NAGs). The non O1 strains are autochthonous to estuarine environment and are widely distributed. These are generally non-pathogenic but known to cause gastroenteritis, soft tissue infection and septicemia in humans.
- *V. cholerae* grow well at 37^{o}C, tolerant to alkali (pH up to 9.2), survive for long period in fresh and marine environment and enter in to VBNC phase during adverse conditions. Infections occur through oral route by contaminated food and water. Attach to intestinal mucosa and produce enterotoxin and cause loss of water and electrolytes due to the disruption in the cyclic AMP system.

Symptoms of illness

Symptoms vary from mild to severe diarrhea (rice water stool), abdominal cramps, nausea, vomiting, dehydration, shock and death in severe cases. Infection of non O1 serotype is associated with exposure to natural aquatic environments, consumption of seafood and exposure to polluted water. Non O1 *V. cholerae* show better survival and multiplication in a wide range of foods than O1 strains.

Conditions for outbreaks

- Consumption of live cells orally through food/water.
- Consumption of post process contaminated food.
- Consumption of food without heating before serving.
- Consumption of contaminated food/water.

Prevention of outbreaks

- Avoiding consumption of contaminated food and water.
- Preventing contamination by following sanitary measures.
- Keeping the surroundings of processing plant clean and disinfected.
- Adherence to good personal hygiene by food handlers.
- Use of potable water after chlorination.

Foodborne gastroenteritis caused by *Vibrio parahaemolyticus*

Characters

- Food poisoning by V. parahaemolyticus is caused mainly by the consumption of seafoods containing live bacteria. It is an autochthonous marine bacterium associated naturally with marine organisms.
- V. parahaemolytixcus is G-ve, straight/curved rod, halophilic requiring 1~3% salt for growth, can grow at 7% NaCl, optimum temperature for growth is 35-37^{o}C but can grow over a range of temperature (10-44^{o}C), minimum temperature for growth is 7^{o}C, grow in a pH range of 5~11, sensitive to freezing and chilling temperature and killed by heating at 100^{o}C.
- Isolates from cases of food poisoning (about 97%) are haemolytic (Kanagawa positive), and majority of environmental isolates are non-haemolytic (Kanagawa negative).
- Food poisoning by this bacterium causes gastroenteritis. These are killed by heating. Following good sanitation and GMP would prevent its build up in foods. This organism is the major cause of gastroenteritis in Japan.

Symptoms of illness

Raw food of marine origin, marine fish, shellfish, crustaceans and fish products are involved in cases of food poisoning. Permissible limit in foods is 104 /g.

Symptoms of illness include abdominal cramps, diarrhea, nausea, vomiting, bloody stools, mild fever, chills and headache. Incubation period is 4-48 hrs and infected individuals recover with in 2-5 days.

Prevention of outbreak

- Cooking food thoroughly
- Chilling food rapidly
- Preventing cross contamination from marine fish
- Following sanitary measures

Foodborne gastroenteritis caused by *Campylobacter*

Characters

- *Campylobacter* are represented by the species *C. jejuni and C. coli* are the major causative agents of bacterial gastroenteritis in humans worldwide.
- These are Gram negative curved rods, motile with single polar flagella at one or both ends.
- *C. jejuni* is associated with intestinal tract of warm-blooded animals and is often present in foods of animal origin through fecal contamination during processing.
- Foods of animal origin including milk and clams have been implicated in cases of food poisoning.
- This organism is unable to grow well and survive outside the animal host's environment, but ingestion of very low numbers can cause human illness.

- *C. jejuni* is microaerophilic aorganism requiring low levels of oxygen for growth. Growth is inhibited at oxygen concentration of less than 3% and more than 10-5%, with best growth at 5%. It grows within a narrow temperature of 30- 47^{o}C with optimum temperature of 42-45^{o}C, survives refrigerator temperature and is sensitive to freezing temperatures.
- *Campylobacter* are invasive and highly virulent requiring ingestion of only a few cells to cause illness.
- Though the actual mechanism of pathogenicity is not clearly understood, they are known to produce heat sensitive enterotoxins.

Symptoms of illness

- *Campylobacter* infections occurs due to the consumption of foods of animal origin and contaminated milk, bakery products, clams and water.
- Symptoms of illness include abdominal pain, nausea, vomiting, cramps, diarrhoea, headache, fever and occasional bloody stools.
- The onset of illness varies from 1 to 10 days, and illness may persist for from 1 day to few weeks but most recover within a week.
- *Campylobacter enteritis* is self limiting in most cases and resolve within few days of onset of symptoms.

Prevention of outbreak

- Proper cooking of food prior to consumption.
- Preventing cross contamination from raw meats to cooked foods.
- Chilling food rapidly.
- Following good sanitary measures while handling and processing of foods.