Cholera
By Reethika Thakkalapally

**Disease:** Cholera; Etiologic agent: Vibrio cholerae.

**Transmission:** The transmission occurs through fecal-oral route (4). The infection is most commonly spread by drinking or eating contaminated food or water (2). The places it is most likely to be found and spread are the places with inadequate water treatment, poor sanitation, and inadequate hygiene (2). The infection causing bacterium is usually found in water or food sources, it can be contrasted through water and food contaminated by feces (poop) from a person infected with cholera (2).

**Reservoirs:** Two reservoirs for V. cholerae are humans and the aquatic environment. Infected Humans are primary reservoirs and they can be asymptotic carriers (6).

**General Characteristics:** The bacterium Vibrio cholerae is a member of the family Vibrionaceae. It is a facultatively anaerobic, Gram-negative, non-spore-forming curved rod which is about 1.4–2.6mm long and is capable of respiratory and fermentative metabolism. The bacterium can be defined on the basis of biochemical tests and DNA homology studies (3). “Serogroups O1 (classical and El Tor biotypes) and O139 are primarily responsible for cholera outbreaks. Pathogenic serogroups produce cholera toxin (CT) while nonpathogenic strains may or may not produce this toxin. Some serotypes may serve as a reservoir for the cholera toxin phage genome. Serotypes that do not produce cholera toxin can still cause illness in humans” (7). The nutritional requirements of the cholera bacterium are simple, which are as the following: “Fresh isolates are prototrophic which means they grow in media containing an inorganic nitrogen source, an utilisable carbohydrate, and appropriate minerals” (4). They can grow rapidly in adequate media. The bacterium can reach higher population densities when grown when grown under vigorous aeration, but they can also grow anaerobically. Vibrios genus are sensitive to low pH and they may die rapidly in solution which has a pH of 6 or lower. They can tolerate alkaline conditions pretty well. This tolerance mechanism is exploited when choosing the media used for their isolation and diagnosis (4).

**Key tests for identification:** The identification of the cholera bacterium is done with serogroup O1 or O139 by taking a stool sample of the specimen and culturing it in the laboratory, this technique remains as the gold standard for the diagnosis of cholera. The Cary Blair media is ideal for the transportation of the bacterium and the thiosulfate–citrate–bile salts agar (TCBS) which is selective, is for isolation and identification (2). There are areas which do not have laboratory testing, for such areas the Crystal VC dipstick rapid test is used in providing an early warning to the public health officials that there might be an outbreak of cholera is occurring soon. “It is recommended that fecal specimens that test positive for V. cholerae O1 and/or O139 by the Crystal VC* dipstick be confirmed using traditional culture-based methods suitable for the isolation and identification of V. cholerae” (2).

**Signs and symptoms of disease:** Most cases with Cholera infection show mild or no symptoms, but they can be severe. After an individual is infected with cholera it may take a few hours to 5 days for symptoms to be visible. Most of the times the Symptoms appear in 2-3 days after infection (2). A very few percentage of people infected will have severe disease with watery diarrhea, vomiting, and leg
cramps. These people may show rapid loss of body fluids which may lead to severe dehydration and shock. If untreated they may die within hours. Severe cholera patients can develop acute renal failure, and electrolyte imbalances can go to coma. If proper treatment is not given to the patient with severe dehydration which can rapidly lead to shock and death in hours (2).

**Historical Information:** Most of the pandemics of this disease begun in India (8). Most of the epidemics are found in sub-Saharan Africa and South Asia, particularly in India and Bangladesh. We can basically say most of the cases are observed in the Asian continent. The information from the past few decades have recorded seven pandemics globally. People from those pandemics have carried the infection to countries around the world. “Cholera became a disease of global importance in 1817, particularly in the Asian countries” (5). “Until 1992, cholera was caused by only two serotypes, Inaba (AC) and Ogawa (AB), and two biotypes, classical and El Tor, of toxigenic O group 1 V cholerae” (4). They can be identified by agglutination reaction in O group 1-specific antiserum directed against the lipopolysaccharide component of the bacterial cell wall and by the bacterium’s demonstration of their enterotoxigenicity. In the year 1992 cholera caused by serogroup O139 has emerged in epidemic proportions some parts of the Asian continent (4). Approximately 3-5 million cases and more than 100,000 deaths occur every year globally (2).

**Virulence factors:** The bacterium V. cholerae produces toxin which is known as cholera toxin, it has the model for enterotoxins, and their action on the mucosal epithelium is responsible for diarrhea of the disease cholera (1). They also secrete the potent cholera enterotoxin, these bind to the plasma membrane of intestinal epithelial cells, their binding to the epithelial cells releases an active subunit that causes a rise in the production of cyclic adenosine 51-monophosphate (cAMP). The presence of cAMP in high level results in massive secretion of electrolytes and water into the intestinal lumen (4).

**Control/Treatment:** Cholera can treated successfully by immediate replacing the water and salt loss in the body through diarrhea. Rehydration is the important step in the treatment of cholera. Oral rehydration solutions are to be given to the Patients, the oral rehydration solution is nothing but a packaged mixture of sugar and salts which should be mixed with water, and these should be given in large amounts. This solution is used globally to treat diarrhea. In Severe cases of cholera they may also require the replacement intravenous fluid. With proper rehydration and care, a minute number of people with cholera die. Antibiotics may decrease the severity of the illness, but rehydration is more important. Persons with severe diarrhea and vomiting, in countries with cholera endemics should check with a doctor as early as possible and maintain their body fluid losses with rehydration (2).

**Prevention/vaccines info, new trails:** Cholera can be prevented by checking and maintaining on proper access to safe water, adequate sanitation, and hygiene. The following materials cover the basics of cholera and other diarrheal disease prevention:

The disease has two oral cholera vaccines are available in the current period which are Dukoral and ShanChol, and these are prequalified by the World Health Organization (WHO) (2).

“WHO and partners are evaluating the use of newer tools to complement these traditional measures. Oral cholera vaccines of demonstrated safety and effectiveness have recently become available for use by individuals. Some countries have already used oral cholera vaccines to immunize populations considered to be at high risk for cholera outbreaks” (2).

**Local and global outbreaks:** The recent information about the outbreaks are following:

In 2012, 245,393 cases in 48 countries with 3,034 deaths have been recorded and as we look at the
cases in the United States there are 18 cases with no deaths (8).

In 2011, 589,854 cases in 58 countries with 7,816 deaths have been recorded. And there was an outbreak in Haiti, 340,311 cases were recorded. There were 42 cases with no deaths in the United States (8).

In 2010, 317,534 cases in 48 countries with 7,543 deaths have been recorded. And an outbreak in Haiti, 179,379 cases were recorded. 15 cases with no deaths were recorded in the United states (8).

Works Cited:


