



Cholera: The Disease of Inequality and Poverty

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Abstract

The cases of cholera in the world are a manifestation of the precarious conditions of the population regarding access to drinking water and sanitation systems and that, in conditions of malnutrition and certain environmental and political situations, end with loss of human life.

Keywords: Cholera; Human Life; Shellfish and Zooplankton

Abbreviations: WHO: World Health Organization; ORS: Oral Rehydration Salts.

Introduction

There are many *V. cholerae* serogroups, but only two—O1 and O139—cause outbreaks. O1 has been the cause of all recent outbreaks. O139, which was first identified in Bangladesh in 1992, has caused outbreaks in the past, but recently it has only been identified in sporadic cases and always in Asia. There are no differences between the diseases caused by one and another serogroup [1].

Cholera Etiology

Cholera is a diarrheal infection caused by the bacillus curved gram negative *Vibrio cholerae*, belongs to the family Vibrionaceae, the vast majority of them are motile with one or several polar flagella, facultative anaerobic, measuring 1.5 to 2.5 μm in length and 0.5 to 0.8 μm in width.

Its habitat is the marine environment in species of fish, shellfish and zooplankton, where it can be found

viable but not cultivable; the human is the transient host that disseminates the microorganism to water sources such as rivers and lakes or food irrigated with said waters. Microorganisms can be recovered from bodies of water in a free-living state, particularly when the water temperature and the concentration of organic matter are high, giving rise to a great ecological impact in the transmission of the microorganism. The reason why *V. cholerae* survives in marine environments is because it produces an enzyme called chitinase that binds to the chitin of shellfish or copepods, allowing them to survive longer, associated with the chitin of free-living marine arthropods. This relationship not only facilitates its environmental persistence, it is also a factor of great importance in its dissemination.

Historical References to Cholera

Until the 19th century, cholera existed only in Asia. The common delta of the Ganges, Brahmaputra and Meghna rivers in India and Bangladesh constituted the historical and ancestral infectious focus of this disease, described for the first time in European literature at the beginning of the 16th century. Its expansion followed trade routes throughout

almost the entire world and caused six pandemics from 1817 to 1923 [2,3].

In 1991, when cholera struck the Pacific coast of several Andean countries in South America, the inadequate functioning of the internal water supply and sewerage systems, the contamination of surface waters and the unsanitary methods storage of water in the home favored the waterborne transmission of cholera. Beverages made with contaminated water and marketed by street vendors, ice, and even commercially bottled water were blamed [2].

In this regard, it was estimated that the cholera epidemic of 1991 was an extension of the seventh pandemic that began in 1961 in Indonesia, and that in the following years it spread to Asia, Africa and Europe [3].

Cholera Reports in Recent Years

According to the World Health Organization (WHO), in 2017, 34 countries reported a total of 1,227,391 cases of cholera and 5,654 deaths, with a fatality rate of 0.5%. In the Asian continent 84% occurred and in Africa 14% of all cholera cases worldwide, and in the Americas, Haiti reported 13,681 cases (1%). Most of the cases correspond to developing countries, which shows us a health and/or infrastructure problem (access to safe water), conditions for outbreaks and epidemics [2].

According to the WHO, during the first nine months of 2022, cholera outbreaks have been reported in at least 26 countries, a worrying increase, since between 2017 and 2021 less than 20 nations reported similar situations in a whole year [4] Table 1.

Affected Region	Disease Status
West and Central Africa	55,289 cases. 1,109 deaths. Spread in the Mano and Congo Basins
East Africa	Cholera outbreaks in conditions of food insecurity due to drought. 7 million malnourished children.
Syria	Origin in the Euphrates River. 80 deaths, 24,000 suspected cases.
Lebanon	448 cases, 10 deaths Affection of water towers damaged by the war.
Nepal	7 cases of cholera. High risk of spread due to poor sanitation and hygiene conditions
Afghanistan	12 deaths and 6000 people infected. Lack of access to drinking water.
Haiti	Up to 8,000 boys and girls under five years of age are at risk of dying from cholera in conditions of malnutrition.

Table 1: Report of cholera cases in 2022 [5,6].

Cholera Epidemiology

Cholera can be endemic or epidemic. Areas in which, in the last 3 years, there have been confirmed cases of cholera with evidence of local transmission are considered endemic, which means that the cases are not imported from other places. Cholera outbreaks/epidemics can occur both in endemic countries and in countries where cholera is not normally present.

In countries where cholera is endemic, an outbreak may be seasonal or sporadic, representing a higher than expected number of cases. In a country where cholera is not normally present, an outbreak is defined by the occurrence of at least one confirmed case of cholera with evidence of local transmission in an area where cholera is not normally present [1].

Transmission Mode

The cholera vibrio is transmitted by the oral-fecal route, mainly through water contaminated with feces, and sometimes through the ingestion of contaminated food, man is the only host. The bacterium is located in the gastrointestinal tract and secretes a toxin that alters hydroelectrolyte transport through the intestinal mucosa, which causes loss of salts and water, and causes profuse, intense, watery diarrhea, the main consequence of which is rapid dehydration which, if not adequately and quickly treated, causes death within hours [7].

Vibrio cholerae 01 can be transmitted in shellfish vectors through natural adherence to the chitinous exoskeleton of shrimp, crabs, and oysters in certain estuarine environments, or food can be contaminated later during preparation or handling. The most frequent food vectors have been raw

or undercooked shellfish, such as mussels, shrimp, oysters, clams, cockles, fish, dried salted fish, and raw ceviche. Raw grains, such as rice and beans, have been implicated in cholera transmission, especially in Africa [2].

Diagnosis of Cholera [2]

Because *V. cholerae* is not the only pathogen that can produce watery diarrhea like rice water, there have been described various types of clinical suspicion criteria associated with risk factors, which are divided into suspected, probable and proven case.

- **Suspected Case:** Area where cholera is not present and the patient over four years of age suffers from acute watery diarrhea and severe dehydration. On the other hand, in areas considered endemic or epidemic and that the patient over four years of age presents watery diarrhea.
- **Probable Case:** Any suspected case that also comes from an epidemic or endemic area, that presents the clinical picture and that is inhabiting said area for more than five days. Another is that they live with someone from an endemic or epidemic area.
- **Proven Case:** Host with suspected diarrheal symptoms and *V. cholerae* 01 or 0139 is identified in feces. Based on the suspicion criteria, the initial bacteriological examination is performed using the direct phase-contrast or field microscopy technique. dark, where its helical motility can be observed. In addition, specific antiserum is used against serotypes 01 and 0139, which block the movement of the microorganism.

Cholera Treatment [1]

Cholera is a disease that is easily treated. Most cases can be successfully treated by prompt administration of oral rehydration salts (ORS). The WHO/UNICEF standard ORS sachet is dissolved in 1 liter of clean water. Adult patients may need up to 6 liters of ORS to treat moderate dehydration on the first day.

Severely dehydrated patients are at risk of shock and require rapid administration of intravenous fluids. These patients should also receive appropriate antibiotics to shorten the duration of diarrhea, reduce the volume of rehydration fluids needed, and reduce the magnitude and duration of fecal *V. cholerae* shedding.

Mass administration of antibiotics is not recommended because it has no proven effect on the spread of cholera and may contribute to antimicrobial resistance.

Conclusion

As long as the population's access to basic water and drainage services is not resolved or their provision is affected by situations of social and political conflict, the affectation of human health by cholera will be a recurring situation of national and international public attention, the vulnerable population being the most affected.

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