

CHOLERA: PATHOGENESIS AND MODERN TREATMENT APPROACHES**Tursunov Dilshodjon O'tkir o'g'li**

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Abstract. *Cholera is an acute diarrheal illness caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. It is characterized by sudden onset of profuse watery diarrhea, leading to severe dehydration and potentially death if not treated promptly. While cholera is rare in developed countries, it remains a major public health concern in areas with inadequate access to clean water, sanitation, and healthcare infrastructure.*

Keywords: *Cholera, G-protein, Euvichol-Plus, Vibrio, Dukoral.*

Pathogenesis**1. Transmission and Colonization**

Cholera is transmitted primarily through the fecal-oral route. Once *Vibrio cholerae* enters the body, it passes through the acidic environment of the stomach and colonizes the small intestine. The bacteria do not invade the intestinal mucosa but instead adhere to the epithelial cells using specific pili and surface proteins.

2. Cholera Toxin Production

The key virulence factor of *V. cholerae* is the cholera toxin (CT), an AB₅-type exotoxin:

The B subunit binds to GM1 ganglioside receptors on the intestinal epithelial cells. The A subunit is internalized and activates adenylate cyclase via G-protein signaling.

This results in elevated intracellular levels of cyclic AMP (cAMP), which triggers massive secretion of chloride ions (Cl⁻) into the intestinal lumen. Sodium and water follow osmotically, leading to copious, watery diarrhea known as “rice-water stools.”

3. Fluid and Electrolyte Loss

The rapid and profound loss of fluids and electrolytes can result in:

Hypovolemia

Hypotension

Hypokalemia

Metabolic acidosis

Acute renal failure

Shock and death in extreme cases

The entire process can progress rapidly, especially in children and immunocompromised individuals.

Clinical Manifestations

Sudden, painless watery diarrhea (“rice-water stools”)

Vomiting

Rapid dehydration

Dry mucous membranes, sunken eyes

Muscle cramps

Decreased urine output

Weak pulse, hypotension, and in severe cases, unconsciousness

Without treatment, severe cholera can lead to death within hours due to fluid loss.

Modern Treatment Approaches**1. Rehydration Therapy (Primary Treatment)**

The cornerstone of cholera management is rapid fluid replacement.

Oral Rehydration Solution (ORS): For mild to moderate dehydration; contains glucose, sodium, potassium, chloride, and bicarbonate or citrate.

Intravenous Fluids (IV): For patients with severe dehydration or those unable to drink; Ringer's lactate is preferred.

Prompt rehydration can reduce the case fatality rate to less than 1%.

2. Antibiotic Therapy

Antibiotics are not always necessary but can reduce the duration and severity of the illness and decrease bacterial shedding.

Doxycycline (single dose) — commonly used for adults

Azithromycin — alternative, especially in children and pregnant women

Ciprofloxacin — another option in resistant cases

3. Zinc Supplementation

In children, zinc supplements (10–20 mg daily) help reduce the duration of diarrhea and improve intestinal mucosal healing.

4. Nutritional Support

Continued feeding, including breastfeeding in infants, should be encouraged during and after rehydration to support recovery and prevent malnutrition.

Prevention and Public Health Measures

1. Water, Sanitation, and Hygiene (WASH)

Use of clean drinking water

Proper disposal of human waste

Regular handwashing with soap

Safe food handling practices

2. Cholera Vaccination

Oral cholera vaccines (OCVs) are effective preventive tools, especially in high-risk areas or during outbreaks:

Dukoral (inactivated vaccine with recombinant B subunit)

Shanchol and Euvichol-Plus (killed whole-cell vaccines)

These vaccines provide immunity for 2–3 years and are included in the World Health Organization (WHO) recommendations for outbreak and endemic settings.

3. Surveillance and Rapid Response

Early detection of outbreaks, community education, and immediate intervention are critical to limit transmission.

Conclusion

Cholera remains a life-threatening disease, especially in resource-limited settings, but it is entirely preventable and treatable. The pathogenesis of cholera revolves around toxin-mediated fluid loss in the intestine, leading to severe dehydration. Modern treatment strategies, particularly rehydration therapy, combined with antibiotics, nutritional support, and public health interventions such as vaccination and improved sanitation, have significantly reduced mortality. Continued global efforts are essential to eliminate cholera as a public health threat.

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