Genus Vibrio:-

Curved Gram negative rods (coma shaped), motile by polar flagellum, they are either:

1-Halophilic, require 8.5% and the isolated human pathogens included are:-

- \textit{V.\ parahaemolyticum} → self limited enteritis from contaminated seafood.
- \textit{V.\ vulnificus} → wound infection

2-Non - halophilic , the most important pathogens are:-

- \textit{V.\ cholera} → cholera
- Non – cholera Vibrio (Non – agglutinable vibrio) → sever enteritis

**General characteristics of V. cholera**

- actively motile Gram negative, curved rod.
- ferment glucose, sucrose & mannose but require few days to ferment manitol (N L F)
- All are oxidase positive
- optimum PH required (8.5)
(T. C. B. S.) alkaline media

\[ \text{Thiosulfate} \downarrow \text{Citrate} \downarrow \text{bile} \downarrow \text{Sucrose} \]

This is selective & differential between sucrose fermenters (V.cholera) & non fermenters (V.parahemolyticum)

-V.cholera killed by acidity and destroyed by 55°C/15 min. & 0.5% phanol.

-It reduce nitrates \( \rightarrow \) nitrite with production of

\textbf{Indole}← used for diagnosis of v.cholera

by (Nitrose indol reaction)

or (cholera red reaction).

This is done by isolating suspected micro – organism on alkaline peptone water with nitrate, then after incubation ← add few drops of concentrated \( \text{H}_2\text{SO}_4 \) → if red color appear means the presence of indole.

\textbf{Antigenic structure of V.cholera}

-All strains share a common, heat labile H, flagellar Ag that is of no value.

-The O, lipopolysaccharide, there are 139 O Ag.
The most important (O₁), but O₁₃₉ also cause classical cholera, and this strain shares the other non- O₁ cholera strains the presence of a polysaccharide capsule. The O₁ organisms can be subdivided into:

- Two biological types Eltor and classical biotype.

**The Eltor show certain biologic criteria:**

1. produce hemolysis.
2. positive vogas- proskauer test.
3. Resistance to polymyxin –B

- Three serological sub types Inaba, Ogawa and every rare Hikojima.

* Vibrio which lack O Ag called NAG vibrio which cause cholera like disease.

**V. cholerae Enterotoxin**

 Called (choleragen) because of its high antigenicity, but the protective role of neutralizing Ab is not clear. This toxin composed of 2 subunits (A&B), Epithelial ganglioside Gₘ₁ serves as a receptor for B subunit ,and this will help entry of A subunit, then activation of A subunit → increase level of intracellular CAMP → Prolong hypersecretion of water & electrolyte → causing watery diarrhea without inflammatory cells (non– invasive) as much as 20-30 L/DAY → sever dehydration and electrolyte imbalance.
Pathogenesis of V. cholera
Cholera is transmitted by fecal contamination of water and food from human sources (infected or carriers), large infective dose must be ingested (about 1 billion bacteria) because they are sensitive to stomach acid.
The micro – organism adhere to epithelial cells of brush border of the gut, multiply and secret enterotoxin and mucinase enzyme which dissolves the protective glycoprotein coating the intestinal cells.

Clinical findings
After IP (1-4) days, a sudden onset of nausea, vomiting and sever profuse diarrhea resemble "rice water" contain mucus, epithelial cells and large number of vibrios leading to marked dehydration. The loss of fluid & electrolytes → acidosis & hypokalemia → cardiac & renal failure. The mortality rate without treatment reach 40%.

Laboratory diagnosis:-
Specimen must be collected in sterile containers (without disinfectant) including:
- Stool or mucus flecks.
- Rectal swab or catheter.
- Vomitus (unusual).
1-Microscopical examination:
   - Cram’s stain → G negative curved rods.

2-Motility test.
a-by stabbing the micro-organism with needle into semisolid media (incubation 24hr at 37°C) → the micro-organism grow forming brush-like growth around the needle.
b-Hanging drop preparation by using slide with central depression and put a drop of stool on cover slip and turn it over the depression, the drop will be hanged and if examined under dark field microscope, the vibrio will be motile.

3-Cholera immobilization test: a serological test done by mixing stool specimen with specific antisera → under dark field agglutination will appear, causing non-motile micro-organism.

4-Culture: the specimen must be inoculated at first into enrichment media (alkaline peptone water) for 6-8hr to facilitate their growth, then subculture on selective media (TCBS).

5-Biochemical tests
   * Cholera red test.
   * Oxidase test.

6-Typing of the isolated micro-organism with specific antisera

7-Serological test could be done as retrospective diagnosis by demonstrating the rising titer of agglutinins (one done in the first 3 days and the other after 7-10 days).
   Antitoxin can be detected by ELISA.
Treatment of cholera:
- Adequate replacement of water and electrolyte to either orally or intravenously.
- Antibiotics such as tetracycline are not necessary but they shorten the duration of illness.

Prevention of cholera:
- Mainly by public health measures that insure a clean water & food supply.
- The vaccine, composed of killed organisms with limited usefulness (only 50% effective in preventing disease for 3-6 months).
- The use of protective tetracycline is effective in close contact.
- Detection of carriers is important in limiting outbreaks.