**Introduction to cholera**

**are among the most common bacteria in surface waters worldwide .they are curved rod and are motile , possessing a polar flagellum. Can grow on simple media that contain mineral salts and sources of carbon and nitrogen.**

**VIBRIO CHOLERA : is often found in the aquatic environment and is part of normal flora of brackish water and estuaries**

**V cholera serogroup:**

**O1 and O139 which causes cholera in human -**

**Other vibrios may cause sepsis or enteritis**



**PROPERTIES**

**1)MORPHOLOGY**

**1)Gram-negative**

**2)the common shape is curved rod and are 2-4µm in length**

**3)motile by means of apolar flagellum**

**4) Temperature 18 - 37ºC and PH=8.5 – 9.5**

**5) Intestinal infection**

**2)PHYSIOLOGY**

**1)Facultative anaerobic**

**2)Asporogenous :**

**not spore-bearing : not producing spores**

**3)Growth stimulated by NaCl :**

**Vibrios their growth stimulated by addition of NaCl.**

**Unidentified vibrios have been called “marine species,” or simply, “marine vibrios.” These marine species are defined as Vibrio strains that are do not grow in nutrient broth without added NaCl.**

**4)Temperature is 18-37 C**

**5)PH = 6-10 , acid labile**

**6)Intestinal infection**

**7)Noninvasive :**

**Non invasive diarrhea is Caused by organisms that donotinvide the linning of the intestinal tract mucosa but remain in intestinal lumen and release toxins that are absorbed and produce diarrhea**

**8)Oxidase –positive  
means the bacterium contains cytochrome c oxidase and can therefore use oxygen for .energy production**



**Cholera disease -----> watery diarrhea -----> dehydration -----> death**

**INFECTIOUS DOSE**

**Infectious dose ranges from 106 – 1011 colonizing units**

**Why such a high dosage?**

**- Series of changes as moves from aquatic environment to intestine**

**-Temperature, acidity**

**- Acidic environment of stomach**

**- Intestinal environment**

**-Bile salts, organic acids, complement inhibit bacteria growth**

**-Must penetrate mucous lining of intestinal epithelial cells**

**LAB DIAGNOSIS**

* **Organism can be seen in stool by direct microscopy after gram stain and dark field illumination is used to demonstrates motility.**
* **Cholera can be cultured on special alkaline media like triple sugar agar or TCBS agar.**
* **Serologic tests are available to define strains, but this is needed only during epidemics to trace the source of infection.**

**CULTURE**

**1-V cholera grow on thiosulfate-citrate-bile-sucrose ( TCBS ) agar, on which it produce yellow colonies that are visible against a dark green background of the agar**

**2-Vibrios grow well at 37C on many kinds of media**

**3-vibrios grow at very high PH = 8.5-9.5 and are raidly killed by acid**



**Virulence factor:**

**1-cholerae toxin (A and B subunites )**

**2-toxin co-regulated piles ( colonization factors )**

**3-flagellar motility**

**4-resistant to bile salts in intestines**

**PATHOGENICITY**

**1.Ingestion of V. cholera**

**2. Resistant to gastric acid**

**3. Attach to the microvilli of the epithelial cell**

**4.Colonize small intestine**

**5. Production of enterotoxin**

**6.Enterotoxin binds to intestinal cells receptors**

**7.Stimulates of adenocyclase**

**8. Increase in AMP**

**9.release large quantities of electrolytes and bicarbonates 10. Watery Diarrhea**

**11. Death**

**VIBRO CHOLERA ENTEROTOXIN**

**-The toxin that causes the diarrheal disease cholera is the cholera enterotoxin with M.wt 84.000 is called choleragen ( CT )**

**-Ingestion of only 5µg of purified toxin resulted in production of 1-6L of diarrheal stool**

**IT HAS A AND B SUBUNIT TOXINS**

**1-One subunit (A) is responsible for enzymatic and intracellular functions**

**2-Five subunit (B) toxin is responsible for binding the toxin to the eukaryotic cell receptor**

**ANTIGENIC STRUCTURE**

**1-H antigen is a single heat-labile flagellar**

**2-V cholera has O lipopolysaccharides that confer serologic specificity**

**3-V cholera O139 does not produce the O1 lipopolysaccharide and does not have all the**

**genes necessary to make this antigen**

**4-V cholera O139 makes a polysaccharide capsule like other non O1 V cholera strains while V cholera O1 does not make a capsule**

**HOW IS CHOLERA TRANSMITTED**

**1-eating food or drinking water that is contaminated with the bacteria that cause cholera (*Vibrio cholerae)***

**2-Human-Human contact does not spread the bacterium**

**People most at risk :**

**1-people with low gastric acid levels**

**A-children : 10x more than susceptible than adults**

**B-elderly**

**2)Blood types**

**O >> B > A > AB**

**MORTALITY RATE**

**1)Causes 120,000 deaths /year world wide**

**2)With prompt rehydration <1%**

**3)Without treatment 50% \_60%**

**SYMPTOMS**

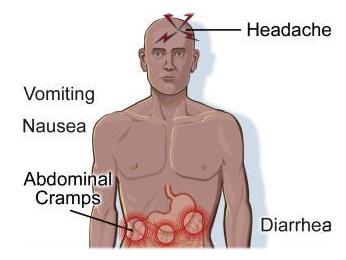
**1. 1-4 day Incubation Period**

**2. Mild diarrhea ------> sudden severe**

**3. Mucus and intestinal tissue visible in feces**

**4.vomiting: after 24h of illness**

**5.Tachycardia with absent of radial pulse**



**PREVENTION AND CONTROL**

**1-Education of population**

**2)Preventing contamination of food and water ( boiling water, covering food)**

**3)Improvement of sanitation**

**4)Injection with vaccine**

**TREATMENT**

**1-Rehydration by :**

**-simple rehydration solution**

**-oral rehydration salts**

**2-ntravenous fluids**

**-unable to drink due to vomiting**

**3-antibiotic**

**-a single dose of doxycycline**

**-tetracyclin**

**4-zinc supplements**

**Research has shown that zinc may decrease and shorten the duration of diarrhea in children with cholera**

**5-vaccines**

**-dukoral ( manufactured by SBL vaccines)**

**-shanchol ( manufactured by shanthabiotic in india )**

**SOURCES**

**1) MEDICAL \_MICROBIOLOGY**

**2)WORLD HEALTH ORGANIZATION**

**3)WIKIPEDIA**