Genus: *Yersinia*

Morphology

Short, pleomorphic Gram-negative rods. They are non motile, micro-aerophilic or facultative anaerobic, species related to this genus have animals as their natural hosts, they are cause ****zoonotic infections** and produce serious disease to humans.

**** [zoonotic infections or zoonosis:** the diseases caused by viruses, bacteria, parasites, and fungi that spread between animals and human**]**.

Species of *Yersinia*

The genus *Yersinia* includes only three species are pathogenic to human, They are:

1. ***Yersinia pestis***
2. ***Yersinia enterocolitica***
3. ***Yersinia pseudotuberculosis***

These three species cause diseases in domestic and wild animals (pigs, rodents, and birds) and humans are usually considered to be incidental hosts.

Both ***Yersinia enterocolitica*** and ***Yersinia pseudotuberculosis*** are zoonotic food-borne pathogens, causing enteritis or mild diarrheal disease after ingestion of contaminated food and / or water.

Yersinia pestis

The causative agent of **plague**, also called **black death**. it's a notorious rat pathogen disease.

Transmission

Transmission to humans occurs through the bite of infected fleas (*Xenopsylla cheopis*) with *Yersinia pestis*.

Rodents serve as the **reservoirs** for *Yersinia pestis*, initial acquisition of *Yersinia pestis* by the **vector** (rat flea = *Xenopsylla cheopis*) occurs during feeding on an infected animal.

Fleas leaves the bodies of dead rats that infected with the *Yersinia pestis* could move to a healthy rat and infect it with the bacteria carried in the flea's intestine. If a human was unlucky enough to be bitten by a flea carrying *Yersinia pestis* , the person would develop plague.

Human can spread the bacterium to others directly (human to human) by coughing, vomiting, and possibly sneezing via air droplets.

Pathogenicity

Yersinia pestis cause the **plague** disease, which takes three main forms:

1. Bubonic plague: transmitted to human by the bite of infected rat fleas. The bacterium spread from a local abscess at the flea bite site to draining lymph nodes. Swollen, blackened lymph nodes (buboes) developed, followed rapidly by septicemia and hemorrhagic pneumonia, then death.

2. Septicemic plague: it is the rarest and most serious of the three plague forms. The bacteria enter the bloodstream, then multiply in the blood, causing bacteremia and severe sepsis.

Bacterial endotoxins cause disseminated intravascular coagulation in which tiny blood clots form throughout the body, commonly resulting

in localized ischemic necrosis, tissue death from lack of circulation and perfusion.

The symptoms associated with septicemic plague are abdominal pain, bleeding under skin due to blood clotting problems, bleeding from mouth, nose or rectum. Gastrointestinal symptoms, including nausea, vomiting, which can be with blood and diarrhea, and death of tissue (gangrene) causing blackening in extremities, mostly fingers, toes and nose.

3.Pneumonic plague: it is a severe lung infection. Pneumonic plague is not vector-borne, like bubonic plague; instead it can be spread from person to person or it can be caused in two ways:

(1) from the inhalation of aerosolized plague bacteria.

(2) when septicemic plague spreads into lung tissue from the bloodstream.

Symptoms include fever, headache, shortness of breath, chest pain, bloody or watery sputum (saliva and discharge from respiratory passages), and coughing.

Laboratory diagnosis

The difference between the forms of plague is the sites of infection; in bubonic plague the lymph nodes, in septicemic plague within the blood, and in pneumonic plague the infection is in the lungs.

Early clinical diagnosis is essential in plague. Specific culture media for blood, lymph nodes aspirates, and sputum specimens are used in first screening. Also, microscopically examination of Gram stained smears of specimens show large numbers of small bacilli. Serological

tests are useful especially when cultures yield negative results. In recent years molecular detection by PCR used for *Yersinia pestis* diagnosis.

Treatment

If plague is suspected, treatment should not be delayed. Control of rats and rat fleas is crucial. Laboratory personnel should be vaccinated because *Yersinia pestis* is an extremely infectious hazard for nursing and laboratory personnel.

Yersinia pestis is susceptible to sulfadiazine, streptomycin, tetracycline, and chloramphenicol.

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