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Plague: An Overview

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Abstract:

Humans and other mammals are both susceptible to the plague. The bacteria *Yersinia pestis*is the causative agent. Most cases of plague in humans occur when they are bitten by a rodent flea carrying the disease or come into contact with an infected animal. Millions of people were killed by the plague in Europe throughout the Middle Ages, which is notorious. Nowadays, plague can be effectively treated with current antibiotics. The disease can cause serious illness or even death if it is not treated quickly. Currently, human plague infections still happen in isolated locations of western United States, but Africa and Asia still have a disproportionately high number of cases.

Keywords: plaque, *Yersinia pestis*, *Xenopsyllacheopis*, bubos

Etiology:

Yersinia pestis is a gram-negative, non-motile, non-sporing, short, thick coccobacillus with rounded ends that belongs to the Enterobacteriaceae family. The pathogen develops capsule in living tissues and exhibits recognisable bipolar staining, giving itself a safety-pin-like appearance.

Host range and reservoirs:

Rats and mice are the main hosts. More than 200 animal species have been reported to be infected with the pathogen, indicating the disease has a broad variety of hosts. The unintentional host can be anything, including cats, pigs, cattle, sheep, goats, horses, camels, kangaroos, donkeys, bats, baboons, deer, antelope, coyotes, ground squirrels, rock squirrels, prairie dogs, rabbits, and chipmunks. Guinea pigs are prone to infection during experimentation. Dogs can become infected without displaying any symptoms, serve as sentinels and their seropositivity may indicate the presence of the plague in a certain location.

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Cats can act as sentinels just like dogs, but they are more likely to get sick.The infection isspread in India by rodent fleas (Xenopsylla*spp*.), ratsand Indian gerbils.

Sources and transmission:

The plague is typically a rodent disease that is spread mostly through flea bites. Unintentional infection of people and other animals occurs as a result of the disruption of the rodent-flea-rodent cycle. The gerbil flea, *Nosapsyllusnilgeriensis*, serves as the disease's vector, while the human flea, *Pulexirritans*, has been implicated in a few instances of interhuman transmission.

Symptoms in animals:

The majority of animals, including dogs, sheep and goats, do not exhibit any clinical plague signs. Rats, however, produce buboes. Mild sickness and buboes in the neck region affect camels. The symptoms of an infected cat include a rise in body temperature, excessive sneezing with purulent discharge, swelling on the submandibular lymph nodes, swelling below the eyes, and overall lethargy. The lymph nodes may develop haemorrhagic, necrotic, oedematous and suppurative conditions after a protracted illness, which can rupture and release creamy pus. Within seven days, the clinical course either terminates in death or improves.

Symptoms in man:

There are numerous clinical manifestations of the illness. The disease has an incubation period of 1–7 days. As flea bites are frequently found on the lower extremities, the bubonic type is the most common and is characterised by swelling (bubo), which typically develops in the groin(s). Less frequently affected areas include the axilla and neck. Untreated cases have a death rate of 50–70%. The septicaemic variant is characterised by a fever that progresses quickly, hypotension, and a significant mortality rate. The pneumonic form, which develops at the end of the septicaemic phase, produces coughing, hemoptysis and other respiratory symptoms that help the pathogen spread to other people through droplet nuclei.

Diagnosis:

- Based on significant clinico-pathological indicators including bubo, s/c and overall congestion, granular liver, congested spleen and pleural effusions
- The presence of plague bacilli in smears made from clinical or morbid specimens, fleas, or dirt from burrows that have the recognisable safety pin appearance.

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- The pathogen's isolation from clinical or morbid materials (bubo aspirate, blood, spleen or liver tissues), fleas, or dirton CIN agar
- Serological testing using techniques like passive haemagglutination inhibition (PHI) and passive haemagglutination (PHA), CFT and IgM capture ELISA
- Bacteriophage analysis using pesticin
- PCR.

Prevention and control:

- Effective flea and rodent control in animal sheds
- Quarantining infected animals
- Avoiding feeding meat that has come from infected/dead animal
- Prompt diagnosis and treatment of ill animals; treatment must begin as soon as a prompt diagnosis has been made based on the clinical picture, serological testing, and/or culture. This is particularly important in the case of pneumonic plague cases, which must be kept in strict isolation and under strict supervision.
- Chemoprophylaxis
- Surveillance and monitoring
- Rodent control
- Vector control. The rat fleas can be destroyed by using BHC as 3% dust or 2% diazenon or 3% malathion.
- Vaccination of high-risk group
- Health education

Treatment

In animals and man:

Tetracycline (4-6 g daily over the first 48 h) is the preferred medication. Chloramphenicol (a total of 20–25g at a rate of 50–75 mg/kg body weight) is the best medication for meningeal plague because it may pass the blood–brain barrier. Streptomycin works quite well. Bubonic plague can be treated with sulphonamides alone, while pneumonic plague cannot. Penicillin has no impact at all. However, other medications like kanamycin and ampicillin are also available for the treatment.

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