



## Glanders: Zoonosis of Equine Origin

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Glanders is a highly contagious and often fatal zoonotic disease primarily affecting equines such as horses, mules, and donkeys. The disease is caused by *Burkholderia mallei*, is a Gram-negative intracellular pathogenic bacterium. Other than equines, glanders can be naturally contracted by sheep, goats, and camels. Carnivores may become infected by consumption of *B. mallei* infected meat. The disease has been eradicated in developed countries. However, the disease is still reported from Africa, Southern Asia, Middle East and Central and South America. In India, the disease is present in almost all equine rearing states. Recent surveillance data indicates detection of a greater number of glanders outbreaks in equines in endemic area as well as spread of disease to new territories by movement of infected equines across state borders for work and trade. Human beings may acquire the infections due to prolonged contact with diseased/ infected animals or through direct contact with organisms.

### Transmission cycle

In animals, ingestion of contaminated feed and water is the major route in disease transmission. Acquiring of the infection through injured skin and mucous membranes are other routes in disease transmission. Disease transmission through inhalation is also reported. Carnivores become infected when they eat contaminated meat.

Glanders is transmitted to human through contact with tissues or body fluids of infected animals or by accidental laboratory exposure. People in close contact with horses (veterinarians, farriers, other animal workers as well as laboratory personnel) are at greater risk for acquiring *B.mallei* infection. Bacteria can enter the body by direct invasion of abraded or lacerated skin; through nasal, oral and conjunctival mucous membranes; and inhalation of infected aerosols. Human-to-human transmission is rare.

### What are the symptoms of glanders in animals?

In equines, glanders have been traditionally classified into nasal, pulmonary and cutaneous forms. In **nasal form**, deep ulcer and nodules develop inside the nasal passages resulting into mucopurulent, yellowish often copious discharge. Discharge

may be unilateral or bilateral and can become blood tinged. Nasal infections can further spread to the lower respiratory tract.

**Pulmonary form** is most common clinical form, often occurring in combination with other forms. This form is characterized by mild to severe respiratory signs such as coughing and dyspnea with febrile episodes and affected animals develop nodules and abscesses in the lungs.

**Cutaneous form (Farcy)** is characterized by development of multiple nodules in the skin along the lymphatics. These nodules may rupture later and ulcerate discharging an oily, thick yellowish exudate. Regional lymphatics and lymph nodes may be swollen and filled with a purulent exudate. Skin lesions usually appear on inner thighs, limbs and abdomen and generally these lesions heal very slowly. Animals with cutaneous glanders may eventually become debilitated and can subsequently die.

Different forms of glanders have been described in humans including localized, disseminated, pulmonary and septicemic. Fever, malaise, fatigue, headache, myalgia, including backache, lymphadenopathy and chest pain have been noticed in most of the patients with glanders infection.

**Localized** infections generally develop within 1-5 days following exposure through cut/scratch in the skin or mucous membranes of eye and nose. Cutaneous exposure starts as a single blister that gradually develops into an ulcer and may even become hemorrhagic. The abscesses can ulcerate and drain for long periods of time. Sometimes, inflammation may extend along regional lymphatics and cause lymphangitis with numerous foci of suppuration along their course. Mucosal exposure through mucous membranes of eye/conjunctiva may result in excessive lacrimation and photophobia. Nasal involvement is characterized by inflammation and swelling of the nose, followed by copious nasal discharge. The face may swell, and regional lymph nodes may become inflamed. Sometimes infection may invade the nasal septum and bony tissues. Sometimes, these localized infections may disseminate, leading to other forms of disease viz., pulmonary, or septicemic forms. Acute pulmonary infections may require 10-14 days for development of symptoms following infection. Cough, dyspnea, chest pain and mucopurulent are commonly noticed in pulmonary infection.

Dissemination from local cutaneous or mucosal infection results in septicemia and the colonization of internal organs such as the spleen, liver, and lungs with the development of abscesses. Abscesses are usually noticed in liver and kidneys. These infections are associated with septic shock and high mortality. In animals, serum samples for serological assays, nasal swabs and needle aspirates (softened, unopened nodules) are required for isolation of *B. mallei*. In humans, blood, serum, sputum, pus from nodules or skin lesions is required for the diagnosis of *B. mallei* infection. Samples under cold chain should be sent to Government of India approved- National Referral Laboratory i.e., ICAR - National Research Centre on equines (NRCE), Hisar, Haryana for both equine and human glanders.

Strict bio security measures must be followed to manage the disease in animals as well as to reduce chances of contracting disease in humans. Early detection, quarantine and elimination of affected animals, disinfection of infected premises, and

proper disposal of carcasses as per existing guidelines are crucial to prevent further spread of disease. Special care should be taken to avoid any transmission of infection through fomites (clothing, shoes, and other belongings of animal handlers). Personnel coming in close contact with the diseased/infected animals should follow high standard of personnel safety, hygiene, and strict antiseptic measures. Researchers working in experimental laboratories needs to follow recommended biosafety procedures to prevent accidental exposure to *B. mallei*. There are no vaccines available against equine and human glanders.

Limited information exists regarding the use of antibiotics for the treatment of infected humans. *B. mallei* has been reported to be susceptible to many antibiotics *in vitro*, however, relapse of symptoms after discontinuation of antibiotics is a major problem. There is no approved treatment regimens against glanders even in developed countries; however, in order to manage laboratory exposures, treatment recommendations have been made. *B. mallei*, being a facultative intracellular pathogen, antibiotics that are incapable of penetrating host cells are not effective. Treatment of glanders requires a concurrent two-pronged approach consisting of both an intensive intravenous (IV) therapy and an oral medication therapy. Antibiotics *viz.*, imipenem, meropenem or ceftazidime with or without trimethoprim-sulfamethoxazole (TMP-SMX) are used for IV medication. Oral therapy timing is also dependent on the severity of the disease and may run 12 weeks to as long as 12 months in duration. In animals, treatment is not recommended. Therefore, present control policy dictates elimination of the test positive animals. However, endangered animals may be treated with prolonged antibiotic therapy.

### **What to do if animal is infected by glanders?**

If the animals are found positive, all control and containment action should be followed as required under the 'The Prevention and Control of Infectious and Contagious Diseases in Animals Act 2009'. The positive animal should be traced immediately and should be eliminated immediately. All the zoo-sanitary measures should be followed at the time of culling and disposal of carcasses. Burning is preferred, but method of burial could also be adopted. For burial, a suitable site away from streams, river, canals or other water supply is to be selected. A pit of minimum 8 ft. deep is to be made. The area requirement is about 3 sq. yards. The dead animal is put into the pit with legs facing upwards which are normally folded. The carcass is covered with quick lime followed by filling of the pit. The burial area is fenced so that stray dogs do not scavenge.

All affected areas including stables, water and feeding troughs, other fittings are disinfected by use of blow lamps or by burning soiled hay and all contaminated disposable equipment and other materials. *B. mallei* is susceptible to 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde, iodine, benzalkonium chloride, mercuric chloride in alcohol and potassium permanganate. It is less susceptible to phenolic disinfectants. This organism can be destroyed by heating to 55°C (131°F) for 10 minutes, or exposure to ultraviolet irradiation. In the environment, *B. mallei* is susceptible to drying and sunlight.