

Popular Article

Lumpy Skin Disease (LSD)

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Abstract

All breeds of cattle and water buffalo (*Bubalus bubalis*) are susceptible to lumpy skin disease, LSD is highly host-specific, and caused by the lumpy skin disease virus (LSDV), it is closely linked to sheep pox virus (SPPV) and goat pox virus (GTPV) antigenically and genetically. The disease is characterized by nodules on the skin, lymph node enlargement, and fever. Direct exposure and mechanical transmission by vectors are the routes of spreading that virus. Strict quarantine procedures and vector control are used to stop the spread of LSDV. Although the vaccine is not available, India uses an attenuated goat pox vaccine. The first case in India was reported in August 2019 from Mayurbhanj, Odisha. The OIE classified it as a notifiable disease and it also has a terrible impact on the global cattle economy. Although the disease is endemic to African nations, but now it has been detected from new regions throughout the world.

Introduction

Lumpy skin disease is an infectious viral disease, which is caused by the LSDV (Lumpy skin disease virus) belongs to the Poxviridae family. The common synonyms of LSD are “Exanthema nodularis bovis”, “nopvelsiekte”, “Pseudo-urticaria”, and “Neethling viral sickness”.¹

LSD is a non-zoonotic, vector-borne, and transboundary disease that only affects ruminants, such as cattle and water buffaloes.¹²

The disease is characterized by a fever, swollen lymph nodes, circumscribed nodules on the skin that cause acute anorexia, decreased milk production, and infertility. Overall, it lowers the economic worth of animals since it reduces their ability to produce meat and milk, high-quality hides, draught strength, and reproductive efficiency (abortion and infertility).¹⁷ Initially, LSD symptoms were thought to be the result of either poisoning or an increased sensitivity to insect biting.

Etiology

The virus that causes lumpy skin disease (LSDV), along with sheeppox virus (SPPV), and goatpox virus (GTPV), belongs to the members of the genus Capripoxvirus (CaPV), which is part of the subfamily Chordopoxvirinae and family Poxviridae. The LSDV is an enveloped virus, with a double-stranded DNA genome and envelope is brick-like.¹⁸



Host Range

Buffalo (*Bubalus bubalis*) and cattle (*Bos indicus* and *Bos taurus*) are vulnerable hosts. Compared to local breeds of cattle, the *Bos taurus* is more susceptible. Animals of all age are vulnerable; however, calves are especially vulnerable and develop lesions within 24 to 48 hours.³ However, skin lesions have been observed following experimental infection in sheep, goats, giraffes, Giant gazelles, and impalas, but natural infection of sheep and goats has not been documented, not even in close contact with diseased cattle and buffaloes.⁴

Wild animals are resistant to infection when living in natural conditions. Typically, it has been discovered that wildlife plays a very small role in the transmission and maintenance of LSDV. Similarly, humans are resistant to the virus.¹⁴

Epidemiology

LSD was first discovered in Zambia in 1929, and from there it spread to the rest of Africa with the exception of Libya, Algeria, Morocco, and Tunisia.⁵ According to OIE, this condition is currently widespread in a number of African, European, and Asian nations.⁶

In India first outbreak of the disease is in the second week of August 2019, affecting 9 cattle in the Odisha state. Later in August, 79 cattle were affected by two further outbreaks in the same state (OIE). Overall, India had apparent morbidity and mortality of 7.1% and 0%, respectively.¹⁸ According to recent studies from epidemic regions in the Middle East and Europe, disease morbidity ranges from 5 to 45%, while cattle fatality is often under 10% (FAO, 2017).

Other states where the disease has been reported include Karnataka, West Bengal, Chhattisgarh, Jharkhand, Assam, Maharashtra, Madhya Pradesh, Kerala, Tamil Nadu, Telangana, and recently Rajasthan and Gujarat.

Transmission

1. Primary route: -The principal means of transmission is believed to be by an arthropod vector.¹⁹ Like insect vectors, Mosquitos, and Biting flies.
2. Secondary route: -The virus is also transmitted through direct contact, contaminated feed, and water and equipment's.
 - Direct contact to the skin lesions, Saliva and Nasal discharge.
 - Milk¹ or semen² of infected animals
 - Iatrogenic transmission²⁰
 - Intrauterine route¹⁶

The main mode of disease transmission is by mechanical transfer by vectors. There have been reports of the ticks *Amblyomma* spp., *Rhipicephalus decoloratus*, *Rhipicephalus*



appendiculatus, and *Amblyomma hebraeum* serving as mechanical vectors and viral reservoirs.²⁰

Clinical signs and lesions

The incubation period of LSDV lasts between two to five weeks, whereas in experimental conditions, it lasts between seven to fourteen days. There are three forms of LSD:-Acute, Subacute, and Chronic form.

The first indication of the sickness is Biphasic fever. Within 2 to 3 days of the fever's development, one or two lumps of nodules, emaciation, agalactia, reluctance to move, inappetence, salivation, lachrymation, and nasal discharge show as clinical signs in the mild type of infection. Infected cattle have swollen superficial lymph nodes (subscapular and pre-crural).⁷

Later, painful, hyperemic nodular lesions may appear over the animal's body, particularly on the skin of the snout, nares, back, legs, scrotum, perineum, eyelids, lower ear, nasal and oral mucosa, and tail.⁷

In a severe situation, more than 100 nodules spread throughout the body's skin and this stage lasts for 7 to 12 days. The nodules are distinct from the surrounding skin by a thin hemorrhagic ring and are firm and somewhat elevated. These nodules affect the muscle, surrounding subcutis, dermis, and epidermis. The lesions subsequently develop into papules, vesicles, pustules with exudate, and finally slowly form scabs. Healing of the lesions is very slow.

The distinctive lesion is known as "sit fast" may develop holes as a result of the lesions sloughing, which may then invite bacterial invasion and screwworm fly invasion, both of which can progress to septicemia.⁸

Lameness and edematous swelling in the limbs of infected animals are other common complications. The sequelae of LSD are pneumonia, Abortion happens in the acute phase of infection, and infertility is another sequela of the disease in both males and females.

DIAGNOSIS

Skin nodules might be used to provide a tentative diagnosis. To detect viruses, electron microscopy can be used on skin samples⁹. The confirming diagnosis in unknown habitats can be made via virus isolation. The primary and secondary cultures of pre-pubertal lambs and bovine testes are the most sensitive to viral isolation¹⁵.

The most effective and rapid test for disease diagnosis is molecular diagnostics using PCR. For quick diagnosis, both traditional and real-time PCR have been developed.¹⁰ It has been developed to distinguish LSDV from other Capri poxviruses using real-time PCR.¹¹ Virus neutralization, ELISA, or direct immunofluorescent staining can all be used for antigen testing.

Clinical symptoms of LSD might be mistaken for those of other illnesses such foot and mouth disease (FMD), an insect bite, demodicosis, and hypersensitivity.



Treatment and Control

There is currently no successful LSD treatment available. The sole known therapy is supportive care for cattle, which may involve administering antibiotics to control secondary skin infections and pneumonia as well as using anti-inflammatory drugs and wound care sprays to treat skin lesions¹³.

Use some efficient preventative and control measures to manage the LSD, like:

a) Restrict animal movement

b) Restrict vector movements

c) Vaccination: Since there are no LSD vaccines available in India, so goat pox vaccine can be used. However, live attenuated vaccine for LSD is available in other nations. According to the OIE, different viral strains are used as vaccine strains, It is either based on the SIS Neethling type or the Neethling strain used in products like the Lumpy Skin Disease Vaccine for Cattle (Onderstepoort Biological Products; OBP, South Africa) or Bovivax (MCI Sante Animale, Morocco) and (Lumpyvax, MSD Animal Health-Intervet, South Africa) respectively. Live attenuated Gorgan goatpox strain provides effective protection in cattle with almost no adverse effects¹⁶. The sheeppox and goatpox vaccines can be used to treat LSD because these two viruses are closely related.⁶

Long-term vaccination with 100% coverage should be made necessary for disease control and prevention as the LSD virus is stable and may last a long period in the environment. New animals should be vaccinated before being introduced to the farm. At three to four months old, calves should have their first vaccination. At three to four months old, calves should get their first immunization, whether they are vaccinated or naturally infected. Bulls are used for breeding and cows that are pregnant can receive annual vaccinations.⁶

Conclusion

LSD is categorized as a notifiable disease because of its economic consequences. Due to its capacity to spread from Africa to other areas of the world, LSD has been considered an agent of agro terrorism.

Due to logistics and lack of knowledge, diagnosing exotic infections can be difficult. The distinctive clinical characteristics of the condition are used to make a field diagnosis of LSD. The reason for the disease spread in India is unknown, however, it might be related to the international movement of cattle and vectors from neighboring countries, including China and Bangladesh.

Due to considerable morbidity and typically low mortality, the condition has significant economic consequences. The whole trade of live animals and animal products will be affected by the animal's quality being reduced. The significant losses are a result of severe emaciation, hide



damage, male and female sterility, mastitis, a decrease in milk output, and abortions.

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