Popular Article

Trends in Agriculutre Science ISSN:2583-7850

Vol.2 Issue 7 July 2023, Page: 536-540

Lumpy Skin disease: An Emerging infection of animals in India

Pooja Solanki[1*], Ajay Saini[2], Vandana[3] and Varun Kumar Sarkar[4]

[1,3,4]PhD Scholar, Division of Medicine, ICAR-IVRI, Bareilly, Uttar Pradesh

[2]Veterinary Officer, VH Ghatiyali, Sawar, Ajmer

https://doi.org/10.5281/zenodo.8167124

Abstract

Lumpy skin disease (LSD) has been portrayed as a frightening threat to cattle population. It is an arthropod borne viral disease, caused by lumpy skin disease virus (LSDV), a member of Capripox virus genus of Poxviridae family and characterized by fever, anorexia, and characteristic nodules on the skin mucous membrane of mouth, nostrils, rectum, genital, udder and drop in milk production. It is a transboundary disease of the economic importance affecting cattle and water buffaloes causes high morbidity and low mortality. The only method for successful control is early diagnosis, strict quarantine, vector control and efficient vaccination.

Introduction

Lumpy skin disease (LSD) is a re-emerging, transboundary viral disease of cattle caused by capripox virus characterized by fever, nodular lesion on the skin and mucus membranes, enlargement of lymph node and edema (OIE, 2017). The disease is known by several names such as "Pseudo-urticaria", "knopvelsiekte" and "Neethling virus disease". LSD mainly affects the cattle and Asian water buffalos (OIE, 2021). All breeds, both sexes and ages are susceptible (Ali *et al.*, 2018). According to OIE, 2013, it is non- zoonotic in nature. Mortality of LSD <10% and a morbidity of 0%– 90% (Sprygin et al., 2018).

History and Geographical distribution

Firstly, LSD was discovered in Zambia in 1929 and considered as a case of hypersensitivity reaction for insect bites or poisoning (Ali et al., 2018). By the 1940s, disease hit to other southern African countries. The disease spreads the Middle Eastern countries since 1990's. In July 2019, first land in the continent of Asia to report LSD was Bangladesh. In India, first LSD outbreaks recorded in Odisha state in August 2019. The origin and source of outbreak is not yet clear, but according to

several authors it may be due to uncontrolled or illegal movement of infected animals, infected animal products or fomites through porous Indo-Bangladesh border, movement of blood-sucking insect vectors by means of wind or vehicular transport (Sethi *et al.,* 2021).

Etiology

LSD is an enveloped, complex, linear, ovoid, double-stranded DNA virus under the family Poxviridae, genus Capripox virus (Yilmaz *et al*., 2017). The prototype of LSDV is Neethling strain first isolated in S. Africa (Alexander *et al*., 1957). LSDV is a double stranded DNA virus with genome of approximately 151 kbp, a central coding region of 156 putative genes. LSDV is homologous to sheep pox and goat pox virus sharing 97% nucleotide identity but phylogenetically distinct.

Economic impact of disease

Multiple industries and sectors have noted the socioeconomic impact of LSD, whether it is direct or indirect. The sharp drop in milk production is the most visible effect directly related to LSD. Furthermore, any lesions, scars, or breaches in raw hides or skins may depreciate leather value (Neamat-Allah, 2015). Farm owners also suffer huge losses from mastitis, orchitis, abortions, and infertility in bulls. LSD indirectly impacts the economy through trade restrictions, quarantine and treatment costs, immunization, feed and labour costs, stamping out, and maintaining farm biosecurity (Das *et al*., 2021).

Transmission

Prime route of transmission is mechanical by vectors. Several blood-sucking hard ticks, mosquito and flies have been implicated in the spreading of LSDV in sub-Saharan Africa (Annandale *et al.,* 2014). Minor route of transmission is direct/indirect contact, skin lesions, body fluids like nasal secretions, saliva, semen, blood and lachrymal secretions, intrauterine route, milk and skin abrasions and iatrogenic route.

Pathogenesis

LSD is manifested by multiple circumscribed cutaneous nodules and accompanied by a febrile reaction. The spread of viral particles occurs through blood and cause generalized lymphadenitis (Lubinga *et al*., 2015). Viremia seen after the early febrile condition. Following skin lesions due to the replication of the virus in certain cells such as pericytes, fibroblasts, and, endothelial cells of blood vessels and lymphatics, lesions are produced in those sites (Abdulqa *et al*., 2016).

Clinical signs

Incubation period varies from 1 to 4 weeks. Symptoms include high body temperature (>40.5°C), enlarged subscapular and pre-femoral lymph-nodes, edema of Brisket and limbs, ocular and nasal discharges, body covered with skin nodules, corneal opacity or blindness, pneumonia,

trendsinagriculturescience.com
trendsinagriculturescience@gmail.com
Published: 15 July 2023

abortion, infertility, orchitis, and decreased in milk production. Cutaneous nodules with diameter of develop on the head, neck, udder, genitalia, limbs and perineum within 48 hours of onset of the febrile reaction. These nodules are circumscribed, round, firm and raised, and involve the skin and subcutaneous tissues. Large nodules may become necrotic and eventually fibrotic and can persist for several months known as "sitfasts", myiasis of the nodules may occur and lesions also observed throughout respiratory and digestive tract (Das *et al*., 2021).

Post Mortem findings

The nodular lesion may be seen in the upper part of the digestive tract, rumen, upper respiratory tracts and even in the lungs. On the histological examination, the epidermis of infected animals shows vesicles, necrotic and degenerative keratocytes, and intracytoplasmic inclusion bodies. The dermis has hemorrhage, edema, lymphocyte influx and a ruptured muscle blood vessel iwall (Sanz-Bernardo *et al*., 2020).

Diagnosis

Presumptive diagnosis done on the basis of history, clinical signs and symptoms. Skin biopsy sample can be collected and transported in medium with 20 to 50% glycerol in phosphate buffer saline for further confirmation of disease. The disease's differential diagnosis should be done with Pseudo lumpy skin disease, Demodicosis, Pseudo cow pox, Besnoitiosis, Onchocerciasis and Bovine popular stomatitis (Gumbe *et al*., 2018).

Confirmative diagnosis can be done by polymerase chain reaction (PCR), Western blot assay and ELISA, which is the quickest and least expensive methods for detection of LSDV. Virus isolation (VI) test followed by PCR to confirm the virus identity which is more expensive but demonstrates the presence of live virus in the sample. Virus neutralisation is the gold standard test according to OIE, for the detection of antibodies raised against capripox viruses.

Treatment

No effective treatment against LSD has been available till date. Symptomatic treatment recommended and broad-Spectrum antibiotics given to prevent secondary bacterial complications (Babiuk *et al.*, 2018). The antiseptic ointment with fly repellent properties can be used (Islam *et al*., 2021). Feeding of liquid, soft food and fodder is advisable. There are no precise antiviral drugs available for the treatment of LSD, thus prevention through vaccination is the only effective way of restraining the disease (Tuppurainen *et al*., 2018). The use of ethnoveterinary medicine has been reported in various gaushalas in India with varying degrees of success.

Prevention and control

The most effective tool to control spread of the vector-borne LSDV is to carry out large-

trendsinagriculturescience.com
trendsinagriculturescience@gmail.com
Published: 15 July 2023

scale vaccination campaigns, comprising the whole cattle population together with cattle movement restrictions. LSD control involves culling vulnerable animals that have been exposed to the infection or at least those showing clinical signs of infection. It is impossible to eradicate the disease in some countries because slaughtering of cattle or other affected animals forbidden by law or for religious or traditional reasons (Roche *et al*., 2021). Above-discussed facts highlight the swift mass vaccinations importance of cattle and water buffalos with a high-quality vaccine having proven efficacy against the virus. Live attenuated LSDV vaccines are known to provide a good protection in cattle (Tuppurainen *et al*., 2017).

Conclusion

Earlier, LSD was restricted to African countries and few other countries but the recent spread of disease to India and other Asian countries, previously disease-free region, is a matter of concern for the livestock rearing sector as most of these countries have agriculture-based economies. To avoid incursion and spread of the disease, movement restriction, vector control, harsh quarantines, improved vaccinations, and proper veterinary care should be prioritized.

References

Abdulqa, H. Y., Rahman, H. S., Dyary, H. O., & Othman, H. H. (2016). Lumpy skin disease. *Reprod. Immunol. Open Access*, *1*(25), 2476-1974.

Alexander, R. A., Plowright, W., & Haig, D. A. (1957). Cytopathogenic agents associated with lumpy skin disease of cattle. *Bulletin of epizootic diseases of Africa*, *5*, 489-492.

Ali. A., Gumbe, F. (2018). Review on lumpy skin disease and its economic impacts in Ethiopia.7:39–46.

Annandale, C. H., Holm, D. E., Ebersohn, K., & Venter, E. H. (2014). Seminal transmission of lumpy skin disease virus in heifers. *Transboundary and emerging diseases*, *61*(5), 443-448.

Authority, E. F. S. (2017). Lumpy skin disease: I. Data collection and analysis. *EFSA Journal*, *15*(4).

Babiuk, S. (2018). Treatment of lumpy skin disease. In *Lumpy Skin Disease* (pp. 81-81). Springer, Cham.

Das, M., Chowdhury, M. S. R., Akter, S., Mondal, A. K., Uddin, M. J., Rahman, M. M., & Rahman, M. M. (2021). An updated review on lumpy skin disease: Perspective of southeast asian countries. *J. Adv. Biotechnol. Exp. Ther*, *4*(3), 322-333.

Gumbe, A. A. F. (2018). Review on lumpy skin disease and its economic impacts in Ethiopia. *J. Dairy Vet. Anim. Res*, *7*(2), 39-46.

Islam, S. J., Deka, C., & Sonowal, P. J. (2021). Treatment and management of lumpy skin disease in cow: A case report. *Int. J. Vet. Sci. Anim. Husband*, *6*(2), 26-27.

Lubinga, J. C., Tuppurainen, E. S. M., Mahlare, R., Coetzer, J. A. W., Stoltsz, W. H., & Venter,

E. H. (2015). Evidence of Transstadial and Mechanical Transmission of Lumpy Skin Disease Virus by A mblyomma hebraeum Ticks. *Transboundary and emerging diseases*, *62*(2), 174-182.

Neamat-Allah, A. N. (2015). Immunological, hematological, biochemical, and histopathological studies on cows naturally infected with lumpy skin disease. *Veterinary world*, *8*(9), 1131.

OIE (2017). Office International des Epizooties. Manual of diagnostic tests and vaccines for terrestrial animals. Chapter 2.4.13. Lumpy Skin Disease, Paris.

Roche, X., Rozstalnyy, A., TagoPacheco, D., Pittiglio, C., Kamata, A., Beltran Alcrudo, D., & Sumption, K. (2021). *Introduction and spread of lumpy skin disease in South, East and Southeast Asia: qualitative risk assessment and management*. Food & Agriculture Org.

Sanz-Bernardo, B., Haga, I. R., Wijesiriwardana, N., Hawes, P. C., Simpson, J., Morrison, L. R., & Beard, P. M. (2020). Lumpy skin disease is characterized by severe multifocal dermatitis with necrotizing fibrinoid vasculitis following experimental infection. *Veterinary pathology*, *57*(3), 388-396.

Sethi, R. K., Senapati, S. K., Selim, A. M., Acharya, A. P., Mishra, C., Das, M., & Biswal, S. S. (2021). Molecular Epidemiology of First Lumpy Skin Disease Outbreak in Odisha, India.

Sprygin, A.; Artyuchova, E.; Babin, Y.; Prutnikov, P.; Kostrova, E.; Byadovskaya, O.; Kononov, A. Epidemiological characterization of lumpy skin disease outbreaks in Russia in 2016. Transbound. Emerg. Dis. 2018, 65, 1514–1521.

Tuppurainen, E. S. M., Venter, E. H., Shisler, J. L., Gari, G., Mekonnen, G. A., Juleff, N., & Babiuk, L. A. (2017). Capripoxvirus diseases: current status and opportunities for control. *Transboundary and emerging diseases*, *64*(3), 729-745.

Tuppurainen, E.S.M., Babiuk, S., Klement, E. (2018). Lumpy skin disease. Springer international Publishing, USA, 47-51.

Yilmaz, H., Richt, J. A., Yilmaz, A., & Turan, N. (2017). Lumpy skin disease in Turkey. *Journal for veterinary medicine, biotechnology and biosafety*, (3, Iss. 2), 45-45.