

PPR disease in small Ruminants: An Emerging Viral Disease

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Abstract

A serious threat to the world's livestock populations has emerged from the extremely contagious viral disease known as *Peste des Petits Ruminants* (PPR), which affects small ruminants. The current state of PPR as a newly developing viral illness in small ruminants is discussed in this abstract, with particular emphasis on how it affects animal health, human livelihoods, and global food security. The scientific and veterinary societies are paying more and more attention to it because of its quick spread throughout continents, especially in Africa, Asia, and the Middle East. Most of the farming communities through-out the world rely on small ruminants for their livelihood sustenance as well as nutritional security. Diseases affecting small ruminants like PPR have a direct effect on global food security owing to economic loss pertaining to kid mortality, un-warranted veterinary expenses and reduced body weight gain. Although there has been significant progress in controlling PPR, obstacles still remain in the form of vaccine coverage issues, a lack of resources in endemic areas, and potential vaccine escape mutations. In order to stop the emergence and spread of PPR in small ruminants and ultimately ensure the welfare of both animals and people in affected areas, it is crucial that governments, international organizations, and the scientific and veterinary communities continue their research and collaborate.

Introduction

The viral disease *Peste des Petits Ruminants* (PPR), also known as sheep and goat plague, has become a serious concern for livestock owners and veterinary professionals all over the world. PPR has consequences for ruminant populations that cross international borders, making it a serious worldwide threat. India, a country where the livestock industry forms a crucial economic pillar, is now included in the dangerous threat's menacing reach.

Overview regarding prevalence in the global as well as India context

PPR began in Côte d'Ivoire in the early 1940s and has since spread its evil influence throughout more than 70 nations in Africa, the Middle East, Asia, and Europe. The Morbillivirus genus contains the etiological agent of PPR, which has genetic connections with the human measles virus. PPR hangs



over India's huge cattle industry, one of the biggest on the planet. Numerous Indian states have acknowledged its pernicious presence, which has sparked a crisis that not only threatens the lives of numerous farmers but also calls into question the country's food security.

Clinical Signs

PPR's clinical symptoms are undoubtedly concerning. Animals with the condition frequently display signs like pyrexia, nasal discharge, chronic coughing, and severe respiratory distress. Conjunctivitis, copious diarrhea, and severe oral sores are some of the cruel side effects, the illness brutally inflicts upon its helpless victims as it advances. PPR's attack goes beyond the aforementioned illnesses; it also cripples milk production and sets off a chain reaction of reproductive abnormalities. PPR's lethality can appear in the most heinous cases with a remorseless mortality rate that soars as high as 90%, transforming it into an unyielding enemy for small ruminant populations. The involvement of both digestive as well as respiratory system in this disease is much pronounced, justifying its popular name as pneumo-enteritis complex.

Pathology

Gross Lesions

1. **Oral Lesions:** PPR frequently starts with lesions in the oral cavity, such as erosions, ulcers, and necrosis on the gums, tongue, and inner surface of the lips.
2. **Respiratory Lesions:** Animals with the condition may experience nasal discharge, congestion, and passageway erosions. Lungs can develop pneumonia, edema, and congestion. Antero-ventral consolidation of lung is more pronounced.
3. **Digestive System:** There are also lesions in the digestive system that can cause inflammation and ulceration in the stomach and intestines. Animals exposed to the problem might get sick.
4. **Lymph Nodes:** Mesenteric lymph nodes, in particular, are frequently found to be enlarged and edematous. These lymph nodes could look enlarged and have bleeding.
5. **Eyes:** It's possible to see ocular lesions like conjunctivitis and corneal opacity, which can cause ocular discharge and occasionally blindness.
6. **Skin Conditions:** PPR-affected animals may develop skin conditions like hyperemia (redness), erosions, and necrosis. The skin can also develop crusts and scabs.
7. **Other Organs:** The liver and spleen may also exhibit lesions in severe cases.



Microscopic Lesions

- 1. Lesions of the Oral and Nasal Tracts:** Microscopic examination of lesions of the oral and nasal tracts typically reveals epithelial cell necrosis, ulceration, and the presence of syncytial cells (large multinucleated cells) brought on by viral infection.
- 2. Respiratory Lesions:** Infected cells may have viral inclusion bodies present as well as lymphocytic infiltration, alveolar damage, and interstitial pneumonia in the lungs.
- 3. Gastrointestinal Tract:** The mucosal lining of the stomach and intestines exhibits villous atrophy, inflammatory cell infiltration, and necrosis.
- 4. Lymph Nodes:** Lymphoid depletion and necrosis, primarily affecting the follicular regions, can be seen in the lymph nodes.
- 5. Eyes:** Conjunctivitis, keratitis, and corneal opacity with infiltration of inflammatory cells may be found upon histological examination of ocular tissues.
- 6. Skin:** Epidermal hyperplasia, keratinocyte necrosis, and the presence of viral inclusion bodies are characteristics of skin lesions.

Conclusion

Peste des Petits Ruminants is a global threat to the small ruminant sector, including India, and crosses national boundaries. A harsh reality is the disastrous toll it takes on small ruminant productivity and health. Despite the fact that vaccinations have become the miracle cure, obstacles still stand in the way of obtaining universal immunization coverage, especially in the most remote regions of the globe. A strong collaboration between governments, veterinarians, and livestock keepers is necessary to combat PPR. Promoting strong biosecurity standards, beginning broad vaccination efforts, and raising public awareness of the disease's seriousness are all crucial first steps in reducing PPR's devastating effects. In addition to preserving the health and vigor of small ruminants, the implementation of these measures strengthens rural livelihoods and safeguards the foundation of food security in the face of this tenacious viral foe. In the global arena, collaboration is essential for mobilizing resources and expertise to manage and eventually eradicate PPR. The achievement of such a worthy goal lays the path for small ruminant populations and the people who depend on them to have a better and healthier future. We can only expect to halt the spread of this new viral plague and guarantee a prosperous future for our animals through unflinching devotion with an aim of doubling the farmer's income by 2030.



References

1. Banyard, A.C., Parida, S., Batten, C., Oura, C., & Kwiatek, O. (2010). Global distribution of peste des petits ruminants virus and prospects for improved diagnosis and control. *Journal of General Virology*, 91(12), 2885-2897.
2. Mishra, A.R., Rath, P.K., Panda, S.K., Nayak, D. (2020). Influence of mutation in nucleoprotein of Peste-des-petits-ruminants virus (PPRV) isolated from 2016 Indian outbreak. *Small Ruminant Research*. 184: 106048.
3. Balamurugan, V., Krishnamoorthy, P., Veeregowda, B. M., & Sen, A. (2012). Rajak's test for the diagnosis of Peste des Petits Ruminants. *Veterinary Research Communications*, 36(1), 23-30.
4. Rath, P.K., Panda, S.K., Mishra, B.P., Mishra, R. and Karna, D.K. (2022). Epidemiology, Haemato-biochemical and Pathological Changes Related to Field Outbreaks of PPR in Small Ruminants in Odisha. *Indian Journal of Animal Research*. 8: 1-7. 10.18805/IJAR.B-4563

