

Peste Des Petits Ruminants (PPR) Outbreak in Goat Farm of Biratnagar, Nepal: A Case Report

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Abstract

Peste des petits Ruminants (PPR) is an OIE – listed transboundary disease that was first recorded in Nepal in 1995. It has spread in all eco-zones of Nepal and has a high economic impact threatening food security, production, and livelihood of the farmers. Many regions of Nepal are stated as endemic areas for the PPR disease mainly border areas that are prone to uncontrolled animal movements from the neighboring countries. Occasional outbreaks are generally recorded from this area in sporadic trends. In February 2020, an outbreak of PPR occurred in an unvaccinated goat farm located in Biratnagar, Morang, Nepal which is a border district and endemic region for PPR in Nepal. Out of 45, 27(60%) of the goats were affected by the disease showing clinical signs of coughing, necrotic stomatitis, severe diarrhea, and nasal and ocular discharges. The post-mortem examination revealed lesions in the lungs, mesenteric lymph nodes, and intestine. The diagnosis was done based on history, findings of clinical manifestation and post-mortem examination, and rapid diagnostic tests. Following infection, necessary treatment and management approaches were implemented. The present study attempts to provide a detailed case study of an outbreak of PPR with a clear history, clinical and laboratory findings, diagnosis, treatment, and management measures implemented following a PPR outbreak.

Keywords: PPR • Transboundary • Endemic • Outbreak

Introduction

Peste des Petits Ruminants (PPR) also known as “goat plague”, is a viral disease of both domestic and wild small ruminants caused by the PPR virus, a Morbillivirus that belongs to the family Paramyxoviridae [1-3]. It is an OIE-listed transboundary disease with a high economic impact that threatens the food security, sustainable sheep and goat production, and livelihood of farmers across the developing world, particularly in Africa and Asia [2,4,5]. Morbidity and mortality of the disease are generally high recorded to reach up to 100% and 90% [2], respectively, whereas the mortality may be as low as 20% in an endemic area [4-6]. The incubation period of the disease is typically 4–6 days but can range between 3 and 14 days. Depending upon the virulence of the virus strain, immunological status, age, gender, and breed of host species, the magnitude of the disease varies, nevertheless, the disease progresses with fever, oculo-nasal discharges (watery to mucopurulent), oral erosions (necrotic to fibrin deposition), pneumonia and diarrhea followed by either recovery or death [1, 5-9]. There has been the presentation of successful control of the disease in an endemic area with the availability and application of attenuated vaccines [5,10].

In Nepal, the first PPR outbreak took place in 1995 and so far, 68 districts, covering all eco-zones have reported outbreaks of the disease [4,11]. Despite various efforts such as the vaccination programs and the National PPR control strategy drafted by the Government of Nepal, there have been frequent outbreaks that have led it to be the endemic disease of the nation. Cross-border movement, illegal animal trade, inadequate vaccine coverage,

and ineffective surveillance are some of the potent causes of the spread of the disease [7]. It has ultimately led to negative production and economic value. Biratnagar, Nepal lies in the Terai belt and is also a major endemic area of PPR in Nepal. In this paper, attempts have been made to present a case report of an outbreak of PPR on a goat farm in Biratnagar with case history, findings of clinical investigation, findings of laboratory examination, diagnosis, treatment, and management in detail.

Case Presentation

History

A farmer with a goat herd comprising thirteen lactating does, seven pregnant does, six bucks, twelve castrated males, and seven kids, brought a 1-year-old dead goat to the Veterinary Hospital and Livestock Service Centre, Biratnagar with complaints of fever, ocular-nasal discharge, oral lesions, coughing and diarrhea in 60% of the herd and mortality of two castrated male (9 months and 1 year old) and two lactating does (4 years and 3 years old) within 10 days span. The symptoms appeared first in two castrated males showing severe manifestation leading to death six to seven days before the outbreak in the herd. The herd was not vaccinated with the PPR vaccine. Also, the management and hygiene of the goat farm were stated poor on examination by the veterinary experts.

Diagnosis

The diagnosis was done based on history, clinical signs, rapid diagnostic test (RDT), and post-mortem examination. Unvaccinated herds in endemic areas are at high risk of the disease which added up as a point of one of the causes of the development of the disease as the herd was not vaccinated with the PPR vaccine. Signs including coughing, soiled vent, severe diarrhea, necrotic stomatitis, and nasal and ocular discharge were seen in morbid goats indicating that the goats might be infected with the PPR virus. For confirmation, a post-mortem examination (Figure 1) and Rapid Diagnostic Test were conducted in the laboratory. A post-mortem examination revealed the following lesions: Advanced pneumonia with extensive dark red/ purple consolidated area with firm consistency in the cardiac lobe (Figure 2), enlarged mediastinal and mesenteric lymph nodes, hemorrhage in the small intestine (Figure 3), and necrotic stomatitis. However, the major pathognomonic lesion of PPR i.e., Zebra

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Figure 1. Post mortem examination.



Figure 2. Consolidation of lungs.

Marking in the caecum, colon, and rectum was not seen. So, Rapid Diagnostic Test was conducted using nasal and ocular discharges from morbid goats and dead goats (Figure 4) using superficial swabs. Sterile cotton swabs dipped into sterile PBS were inserted carefully into nasal orifices/ conjunctival sac, swirled around and the swab probably containing the antigen was used for the test. Within 20 minutes, the test showed a positive result for the PPR virus (Figure 5). Thus, clear history, clinical manifestations, post-mortem examination, and positive Rapid Diagnostic Test results lead to the conclusion that the herd was infected with the PPR virus. The studies by Abdollahpour G, et al. [12], El-Yuguda AD, et al. [13] and Kumar P, et al. [14] claimed that in 80-90% of cases, mesenteric lymph nodes and lungs are involved in a severe manner which differentiates this case from Rinderpest. Similarly, severe diarrhea and necrotic stomatitis observed, in this case, preclude CCPP (Contagious Caprine Pleuro Pneumonia) as the cause of the outbreak.

Treatment and management

Post-exposure therapeutic approaches were promptly initiated to the

morbid goats to alleviate the symptoms using the anti-diarrheal drug, a broad-spectrum antimicrobial drug, an antihistaminic drug, and fluid therapy. Oral lesions were cleaned using KMnO_4 and boro glycerin after washing the area with a dilute iodine solution. Metronidazole @10mg/kg body weight I/V OD was used to alleviate severe diarrhea and prevention of secondary anaerobic bacterial infections. Third-generation cephalosporin @ 2mg/kg body weight I/M BID was used to cure respiratory problems and prevent secondary bacterial infections. In addition, Meloxicam @0.5 mg/kg body weight I/M OD was used as an anti-inflammatory and analgesic drug. Antihistaminic @ 2 ml IM \times 3 days was given for the treatment of pneumonia. To replace fluid and electrolyte loss, Ringer's lactate solution (500 ml) and dextrose 5% (500 ml) were given intravenously for 3 days. The affected goats were isolated from the rest of the herd, treated well, and quarantined for 15 days. The animal movement was restricted. Sodium hydroxide (2%) was used to disinfect the area and completely kill the virus from the farm to prevention of the disease. The farmer



Figure 3. Hemorrhage in the small intestine.



Figure 4. Nasal sample collection for RDT.



Figure 5. Positive RDT Test.

was advised to vaccinate the goat herd once the entire goat gets healthy and immune. Improvement was observed by the end of the course with complete recovery after 15 days of treatment in addition to the death of two more severe infected goats.

Discussion

This case study was seen in Morang district which is an endemic region for PPR and also the border area close to India; these areas contain numerous unauthorized channel links between India and Nepal leading to the transport of goats in Nepal with no quarantine and proper health protocols causing high animal movements and ultimately outbreaks of the PPR disease [11]. Not only that, A seroprevalence study of PPR in mid-western development region states the prevalence is generally high in mountain regions followed by hills and terai due to excessive movements of nomadic herds of goats, use of same pastures, geographical difficulty, and low vaccine coverage [15]. These studies sum up to denote that, the spread of the PPR virus is significant in all three belts (mountain, hill, and terai) of Nepal.

PPR is a highly contagious and deadly viral disease in goats. The disease is usually seen in adults (1 to 5 years) which is similar to our case report [4,16]. Similarly, a study concluded that the clinical manifestation and post-mortem examination were enough to diagnose PPR in endemic areas [17]. However, a Rapid Diagnostic Test was performed in this case using nasal samples in addition to history, signs, and postmortem examination. The test has sensitivity and specificity of 84% and 95% respectively [18]. Also, nasal discharge is regarded as a less traumatic and good source of antigen for the diagnosis [19]. The clinical manifestations and postmortem findings were similar to many reports and studies regarding PPR [1,8,15, 20,21]. However, this study did not report the 'Zebra Marking' in the rectum, colon, or cecum which is a major pathognomonic lesion of PPR. It might be due to the death of the examined goat before the virus could spread to the intestinal region.

One of the major causes of mortality in PPR is secondary bacterial infections. Therefore, supportive antibiotic therapy is essential to control infections [22]. Many studies demonstrated that oxytetracycline, sulphonamides, or ciprofloxacin were the choice of drugs to control secondary infections [6,13,20]. However, due to the resistance to the mentioned antibiotics in the Morang district [23], third-generation cephalosporin was used. It showed a better result of a 91.3% survival rate compared to the survival rate of 67.15% using Oxytetracycline as described in a study by Kwiatek O, et al. [17]. Some articles also indicated the use of atropine along with antihistamines and fluid

therapy to treat the condition [20,21]. However, atropine was not used in this case. The applied therapy was effective in increasing the chances of survival [24,25].

Conclusion

Peste des Petits Ruminants (PPR) is regarded as an economically important and highly contagious viral disease which affects the production and economic value of Nepal. Huge outbreaks were also reported from areas of Rautahat, Ilam, and Jhapa districts which are all border districts and pose a huge threat to spread all over the country. PPR has spread in all the belts and districts of Nepal due to the carelessness of the governmental authority regarding the implementation of border protocols and vaccine supplementations. There is no specific treatment for this viral disease thus proper symptomatic treatment and good hygiene are always recommended. Proper management in intensive and semi-intensive rearing is essential for the prevention of the disease. Strict border protocols, good vaccination strategy, various quarantine check posts, and awareness campaigns in border district areas regarding the negative effects of unauthorized animal movements from the neighboring countries play a major role in controlling the PPR disease.

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