



SHORT COMMUNICATION

Patho-morphological Based Diagnosis of Peste Des Petits Ruminants (PPR) in Goats

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Received: 27 Feb., 2018

Revised: 27 May, 2018

Accepted: 29 May, 2018

ABSTRACT

The present study describes pathological findings in 25 cases of Peste des Petits Ruminants (PPR) infection. Out of 462 goats carcass examination, in which 262 cases were from slaughtered animals and 200 cases were from fallen animals. On post mortem examination, pathological findings included erosive ulcerative stomatitis, severe haemorrhagic enteritis along with enlarged mesenteric lymph node. The large intestine of affected animals showed pathognomonic haemorrhages like zebra striping (zebra marking) and ecchymotic haemorrhages in abomasum. Histopathological lesions were characterized by syncytial cell formation, infiltration of mononuclear cells with eosinophilic intranuclear inclusions in alveolar macrophages of lungs section. Gross and histopathological lesions were suggestive for PPR infection, which was further confirmed from the specialized PPR laboratory in Mukteshwar (Uttarakhand) Regional Station of ICAR, IVRI using s-ELISA.

Keywords: Goats, histopathology, lung, PPR

Peste des Petits Ruminants (PPR), also known as Goat Plague, occurs in small ruminants. Disease is caused by a virus belonging to genus *Morbillivirus*, family *Paramyxoviridae* and it is antigenically related to rinderpest disease (Gibbs *et al.*, 1979). PPR has become endemic in India since it was first reported from the south Indian state Tamil Nadu in 1987 (Shaila *et al.*, 1989). Both PPR and rinderpest viruses have been found to cause similar diseases in small ruminants (Diallo *et al.*, 1989). On the basis of data reported by Government of India, average annual economic loss of ₹ 125.67 lacs in goats is due to PPR infection (Singh *et al.*, 2014). The current investigation was aimed to describe PPR infection in fallen goats employing gross and microscopic pathology.

A total of 462 lungs and others affected organs sample from goats were collected during August 2015 to April 2016 from various sources such as Bareilly and Delhi

slaughterhouses and post-mortem facility of IVRI. Out of 462 lungs, 262 cases were from slaughtered animals and 200 were from fallen animals. Appropriate representative tissue samples from lungs were collected in 10% neutral buffered formalin. During histopathological processing, the thin pieces of fixed tissue samples were kept in running tap water for overnight washing, then dehydration was done through ascending grades of alcohol followed by clearing with acetone and benzene and then embedding in paraffin wax blocks in automatic tissue processor and the tissues were then cut into 4-5 µm thick paraffin sections by microtome and stained with routine haematoxylin and eosin technique (Bancroft and Gamble, 2008).

Out of 462 goats carcasses examination, 25 (5.41%) cases were confirmed positive for PPR from the specialized PPR laboratory in Mukteshwar (Uttarakhand) Regional Station of ICAR- IVRI. During necropsy, most of the carcasses

were found to be dehydrated and emaciated with sunken eyes, but some goats were in good body condition at early infection. Most dead goats showed necrotizing and erosive stomatitis. The buccal cavity revealed erosive and ulcerative lesions on the tongue, gums, dental pads, hard palate and soft palate (Fig. 1).



Fig. 1: Bran-like deposits-discrete tiny necrotic ulcerative foci in the mucous membrane with ulcerative stomatitis (arrows)

Grossly, respiratory tract examination revealed frothy exudates and congestion in tracheal mucosa. The lung showed pneumonic lesions in all necropsied goats. The most commonly affected lung lobes were apical and cardiac lobes which revealed red hepatization (consolidation) and congestion (Fig. 2). In three goats, severe consolidation with fibrin deposition on the lobes was also recorded.

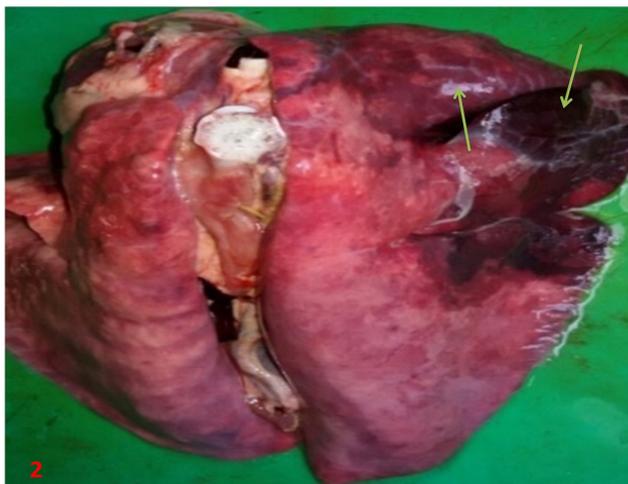


Fig. 2: Gross lesion of PPR affected goat lung showing congestion and consolidation of anterior and cardiac lobes (arrows)

In addition, emphysema was also observed. On cut sections, lungs showed large quantities of frothy exudates indicative of pulmonary edema. In intestines, moderate to severe haemorrhagic enteritis characterized by hyperaemic thickened intestinal mucosa with haemorrhagic intestinal contents were recorded. Mesenteric lymph nodes were most commonly affected which were generally enlarged, oedematous and congested (Fig. 3).



Fig. 3: Gross lesion of the intestine of PPR infected goat showed severe enteritis with haemorrhages and congestion in the small and large intestine with enlarged mesenteric lymph node

In the digestive tract, abomasums of three goats revealed ecchymotic haemorrhages (Fig. 4) and large intestine of affected animals showed pathognomonic zebra striping (zebra marking) (Fig. 5).

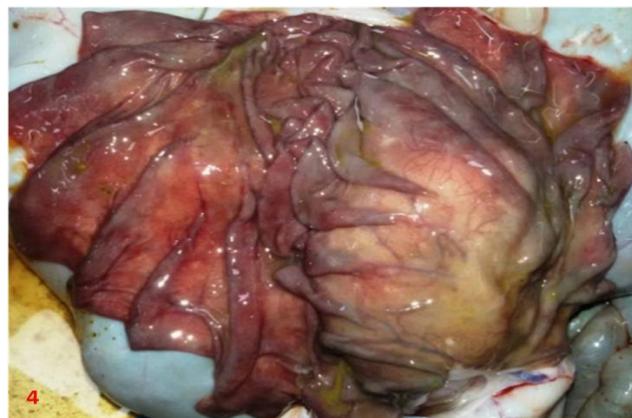


Fig. 4: Gross pathological lesions at post-mortem in goat infected with PPR showed ecchymotic haemorrhages in the abomasum

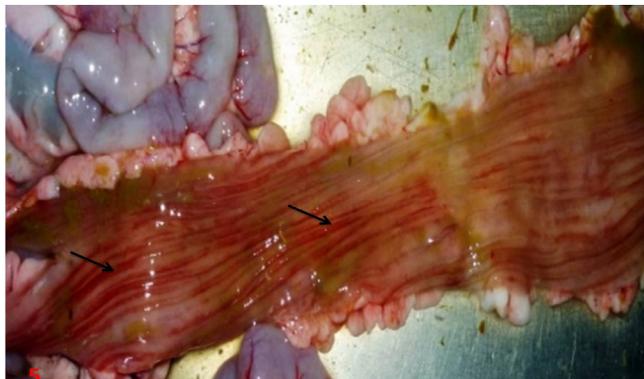


Fig. 5: Gross pathology of large intestine of PPR affected goat showed pathognomonic zebra striping (zebra marking) (arrows)

The gross lesions observed in the present study included erosive ulcerative lesions in the mouth, respiratory and gastrointestinal tract were also reported earlier in PPR infected in sheep and goats by many workers (Chauhan *et al.*, 2011; Jagtap *et al.*, 2012; Rosemary *et al.*, 2013; Patel *et al.*, 2015; Singh *et al.*, 2017). In the present study, pneumonic lungs were observed probably due to descending upper respiratory infection of PPR complicated by secondary bacterial infection (Rosemary *et al.*, 2013).

Microscopic examination of the lungs section of affected animals showed varying degrees of lesions in parenchyma. The alveolar and bronchial lining epitheliums were showed hyperplasia. There was thickening of interalveolar septa due to increased infiltration of lymphocytes, macrophages and variable sized syncytial giant cells (Fig. 6).

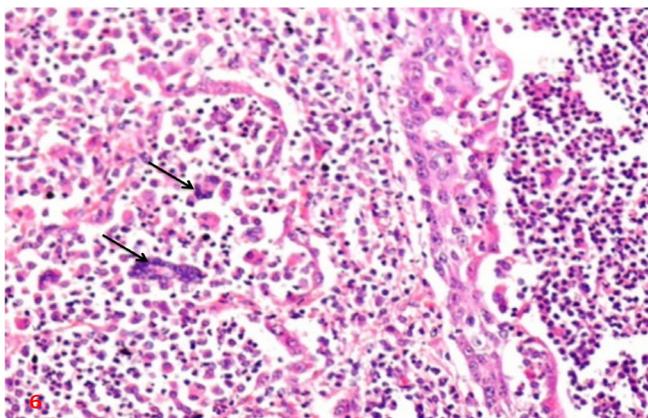


Fig. 6: The lung sections of PPR affected goat showing acute interstitial pneumonia characterized by broncho-alveolar hyperplasia with type II pneumocytes and multinucleated syncytial cells (arrows, 200x) H&E Stain

These lesions were shown similarity with the earlier observations of various researchers (Jagtap *et al.*, 2012; Maina *et al.*, 2015; Patel *et al.*, 2015). In addition, some cases of the syncytial cells showed the presence of eosinophilic intranuclear inclusions in the alveolar macrophages (Fig. 7).

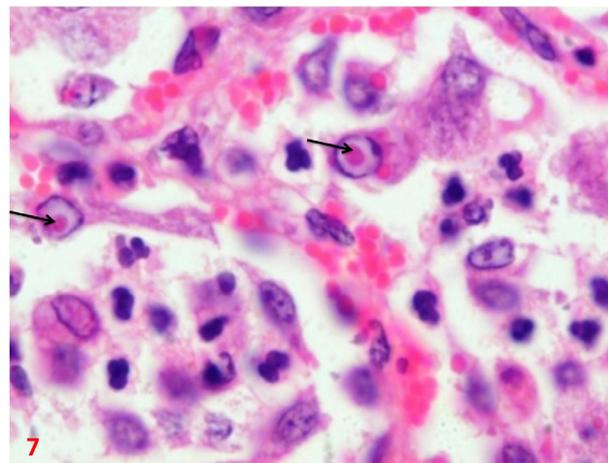


Fig. 7: Lung section of PPR affected goat showed the presence of eosinophilic intranuclear inclusions in alveolar macrophages (arrows, 1000x), H&E stain

In the present study, presence of syncytial cells and eosinophilic intranuclear inclusions were supported by the earlier reports (Islam *et al.*, 2001; Kumar *et al.*, 2004).

Patho-morphological lesions were suggestive for PPR infection, which was further confirmed by specific sandwich ELISA test using PPR specific monoclonal antibody (clone 4G6) to an epitope of nucleocapsid protein in specialized PPR laboratory in Mukteshwar (Uttarakhand) Regional Station of ICAR, IVRI. In the present study, confirmatory diagnosis based on s-ELISA has similarity with the earlier observations of various researchers (Singh *et al.*, 2004; Mahajan *et al.*, 2017)

CONCLUSION

The present study concluded that the post-mortem and patho-morphological finding were suggestive of PPRV infection in goats, which was confirmed by the detection of PPRV antigen in post-mortem samples using the s-ELISA by the specialized PPR laboratory in Mukteshwar (Uttarakhand) Regional Station of ICAR- IVRI.

ACKNOWLEDGEMENTS

The authors are thankful to the Director and Joint Director (Research) of the institute for providing the funds and facilities to carry out this work.

CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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