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### SEROPREVALENCE AND INCIDENCE OF PPR AMONG POPULATION OF SMALL RUMINANTS IN WEST BENGAL, INDIA

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**Abstract:** The present study was aimed to determine the seroprevalence and incidence of Peste des Petits Ruminants Virus (PPRV) among sheep and goat population of West Bengal, India. For studying the seroprevalence, serum samples were collected and the clinical samples were considered from the suspected and affected animals of urban, semi-urban and rural area for the detection of PPRV antigen. The collected serum samples were then subjected to c-ELISA for detection of PPR antibody and the clinical ante-mortem and post-mortem specimens were subjected to s-ELISA for detection of PPRV antigen. Seroprevalence of the disease was found to be more in rural and semi-urban area than in the urban locality of West Bengal.

**Keywords:** c-ELISA, Clinical samples, PPRV, s-ELISA, Seroprevalence

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## INTRODUCTION

The causative agent of this economically important disease of small ruminants is a *Morbillivirus*, the Peste des Petits Ruminants Virus (PPRV), under the family *Paramyxoviridae* of order *Mononegavirales*<sup>1</sup>. The virus is closely related to Rinderpest virus (RPV), another member of *Morbillivirus* genus, which causes similar disease in large ruminants<sup>2</sup>. The virus is also serologically related to Measles and Canine distemper virus<sup>3</sup>. Like all members of the family, the PPR virus is an enveloped pleomorphic particle of size between 150 and 390 nm<sup>3</sup> containing non-segmented single stranded RNA genome of negative polarity<sup>4</sup>.

A provisional diagnosis of PPR can be made from epidemiological and clinical features of the disease. To differentiate it from rinderpest and other acute diseases with grossly presenting similar signs, some laboratory tests are needed for proper diagnosis. These include detection of virus itself, evidence of the presence of the virus (viral antigen or genetic material) or antibodies against the virus found in blood serum<sup>4</sup>.

After considering the aforementioned points, the present study was planned with objectives of studying the seroprevalence study of Peste des petits ruminants virus (PPRV) in goats of West Bengal, detection of Peste des petits ruminants Antigens in field samples.

## MATERIALS AND METHODS

Blood samples and suspected clinical samples from both ante-mortem and post-mortem (n=204) cases were collected for PPRV detection from sheep and goats showing symptoms and lesions suggestive of PPR from Cattle Ward, Faculty of Veterinary & Animal Sciences, West Bengal University Of Animal and Fishery Sciences, Kolkata, India and from urban, semi-urban and rural regions of West Bengal. The samples were subjected to sandwich-ELISA for studying the disease incidence. The collected suspected samples were preserved at -20°C for future use.

Blood samples without anticoagulant were collected from suspected, non-vaccinated and apparently healthy goats of different zones of West Bengal. Sera were separated and stored at -20°C. Sera samples were screened by c-ELISA.

2.5 ml (approx.) blood was drawn from the external jugular vein by veinipuncture of the 365 susceptible goats aseptically for carrying out c-ELISA.

For detection of PPRV antigen from collected ante-mortem and post-mortem swab samples, s-ELISA was carried out as per standard protocol using prepared reagents of capture antibody, detection antibody, reference positive and negative antigens, negative serum and anti-mouse HRPO-conjugate. The plate was read in an ELISA plate reader at 492 nm.

For interpretation and for calculation of cut off point, four antigen blank wells having extreme OD values (two wells of lowest OD values and two wells of highest OD values) were excluded.

The remaining four wells having intermediate OD values were considered. Cut off was taken as two times the mean OD of these intermediate wells. Samples having more OD than the cut off were taken as positive, while samples having less OD than the cut off were taken as negative. Further, a sample positive in both the duplicate wells was taken as positive. A sample positive in one well and negative in other duplicate well was retested before recording the results.

The test sera samples showing more than 40% inhibition of mean OD values of the Cm wells were considered as positive for PPR antibodies provided other controls fell within the range.

The detect ability of PPRV antigen in both ante-mortem and post-mortem samples of infected goats were investigated by s-ELISA. PPR c-ELISA and sandwich-ELISA kits for PPRV antigen detection along with the user manual was obtained from Rinderpest laboratory, Division of Virology, Indian Veterinary Research Institute, Mukteswar Campus.

## RESULTS

The overall seroprevalence of PPRV antibody in the suspected serum samples was determined to be 31.23% by c-ELISA technique (**Table 1**). The seroprevalence of PPR was found to be highest in rural area (35.59%) of West Bengal followed by semi-urban and urban area. All the clinical ante-mortem and post-mortem samples were subjected to s-ELISA for detection of PPRV antigen. Out of total 160 no. of ante-mortem and post-mortem samples tested by s-ELISA, 49 samples were found positive to PPRV antigen, respectively (**Table 2**). Among the ante-mortem samples collected from the suspected PPR outbreaks, 47.50% nasal swabs, 35.00% ocular swabs, 22.50% buccal swabs and 17.50% rectal swabs were found positive by s-ELISA and overall positivity was observed in 30.63% (**Table 2**).

**Table 1. Seroprevalence of antibody of PPRV in different regions of West Bengal**

Region type	Total number of samples collected	Number of positive sample	Seropositivity (%)
Urban	65	16	24.61
Semi-urban	182	56	30.77
Rural	118	42	35.59
Total	365	114	<b>31.23</b> (overall)

**Table 2. Results of s-ELISA for detection of PPRV antigen from different ante-mortem and post-mortem samples**

Clinical specimen	Total number of sample	s-ELISA	
		No. of positive sample	Positive (%)
Ante-mortem Ocular swab	40	14	35.00
Nasal swab	40	19	47.50
Buccal swab	40	9	22.50
Rectal swab	40	7	17.50
<b>Total</b>	<b>160</b>	<b>49</b>	<b>30.63 (overall)</b>
<b>Post-mortem</b>			
Lung	8	5	62.50
Spleen	6	4	66.06
Large Intestine	5	3	60.00
Mesenteric lymph node	7	4	57.14
Tongue	3	0	0
Liver	7	3	42.85
Small intestine	6	2	33.33
Trachea	2	1	50.00
<b>Total</b>	<b>44</b>	<b>22</b>	<b>50.00 (overall)</b>

(P<0.01)

## DISCUSSION

Detection of PPRV antibodies can be attempted for the diagnosis of PPR, however, in areas where specific vaccination against PPR is practiced, detection of PPRV antibodies may yield false picture of the prevalence of infection. Presence of maternal antibodies may further contribute to this problem. Virus isolation, AGID and CIEP were among the most commonly used tests for detection of PPRV. However, AGID and CIEP are not sensitive enough to detect the low quantities of virus. On the other hand, virus isolation technique, which is more sensitive, takes one or two weeks to obtain a result. These limitations are overcome with development of mAb-based sandwich ELISA, which is highly sensitive and rapid<sup>5</sup>.

With the advent of mAb based ELISAs (cELISA and immunocapture or sandwich ELISA) and molecular biological techniques, rapid and specific diagnosis of PPR has become possible<sup>5-7</sup>. Taylor<sup>8</sup> reported that outbreaks of PPR usually occurred following introduction of new animals in the flocks and a similar outbreak of PPR in regional Goat Breeding Farm at Debipur in Tripura after the introduction of Barbari goats from Makhdoom, Uttar Pradesh. The constant movement of herds of goats over large areas and within different states may be greatly facilitating the spread of infection among goat<sup>9,10</sup>.

## CONCLUSION

In the present study, it was concluded that PPR infection was more prevalent in semi-urban areas and among ante-mortem samples nasal, buccal and ocular swab samples should be preferred as diagnostic sample over rectal swab.

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