Original Research Article

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Seroprevalence of *Peste des Petits Ruminants* (PPR) in Navsari and Valsad Districts of South Gujarat

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ABSTRACT

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In the present study, a total 210 blood/serum samples were collected from goats housed in various farms, local flocks and panjarapoles located in Navsari and Valsad districts screened for *Peste des petits ruminants* (PPR) specific antibodies using PPR C-ELISA kit. Out of 210 serum samples 99 were found positive for PPR antibodies with overall seroprevalence of 47.14 per cent. District wise the seroprevalence in Navsari and Valsad districts was 60.44 per cent and 23.68 per cent, respectively. Females of this species showed higher seroprevalence (56.20, 86/153) rate in comparison to their counterpart male (22.80, 13/57). Seroprevalence was comparatively higher in November (90 %) followed by December (59.25%), January (52.17%) and August (11.11%) month. The age-wise seroprevalence was 68 per cent and 36.36 per cent in <1 year and 1 to 3 years of age group, respectively. Interpretation of complete blood count result shown decrease in Hb, PCV, monocytes and MCV value of seropositive group when compared with seronegative group. While biochemical parameters, ALT, ALP level and creatinine value were increased in seropositive groups of animals.

Introduction

Peste des petits ruminants (PPR) is an acute febrile viral disease of goats and sheep caused by RNA virus belonging to the genus *Morbillivirus* of *Paramyxoviridae* family (Gibbs *et al.*, 1979). PPR is also known as kata, stomatitis- pneumoenteritis complex, goat plaque and pseudo- rinderpest (Jubb *et al.*, 2007). The disease is highly contagious causing varying degree of morbidity and mortality in susceptible animals (Radostits *et al.*, 2007).

In India, PPR was first reported in 1987 from Tamil Nadu (Shaila *et al.*, 1989) and it continues to be present in the Southern India until 1994. Later, a number of PPR outbreaks were reported from the northern states of India (Nanda *et al.*, 1996) with a solitary report in Indian buffalo in southern state (Govindarajan, 1997). The previous reports documented the presence of PPRV in Rajasthan in the north (Kataria *et al.*, 2007), Kolkata region in the east (Saha *et al.*,

2005), Karnataka in the south (Chavan *et al.*, 2009) and Maharashtra in the west (Santhosh *et al.*, 2009) and across the southern peninsula (Raghavendra *et al.*, 2008).

PPRV was serologically confirmed from Gujarat by Hinshu *et al.*, (2001) followed by many researchers (Tiwari, 2004, Kanani *et al.*, 2006, Nagraj, 2006, Balamurugan *et al.*, 2011 and Chandrashekar *et al.*, 2011). Recently, an outbreak of PPR was reported in Navsari and Valsad district of Gujarat (Sharma *et al.*, 2015 and Thakor *et al.*, 2016).

Organized clinical surveys or confirmation of outbreak status has not been performed for PPR in India except for a few isolated clinical reports from different State Animal Husbandry Departments (Singh *et al.*, 2004). The majority of these reports except for the one by Singh *et al.*, (2004) included only regional data from various states of India since 1994. Hence present experiment has been carried out to known status of PPR in two districts of South Gujarat.

Materials and Methods

A total of 210 blood/serum samples collected from goats housed in various farms, local flocks and panjarapoles located in Navsari and Valsad districts were screened for PPR specific antibodies using PPR C-ELISA kit. The tested serum samples showing less than 50.00% inhibition of mean OD values of wells were considered as positive for PPR antibodies.

PPRV antibody was detected by PPR C-ELISA kit obtained from IDvet, FRANCE. The competition percentage (S/N %) was calculated for each sample and then grouped as positive (S/N % $\leq$ 50%), negative (S/N % $>$ 60%) or doubtful (50% $<$ S/N % $\leq$ 60%). Various haematological parameters such as

Hb, PCV, TEC, TLC, MCV, MCH, and MCHC were estimated by using fully auto hematology cell counter (Exigo EOS Hematology Analyzer) while Differential Leukocyte Count (DLC) was done manually by screening blood smear.

Serum biochemical parameters such as Creatinine, ALP, AST and ALT were analyzed using Reactivos GPL kits (CHEMELEX, S. A., Pol. Ind. Can Castells. C/ Industria 113, Nau J, 08420 Canovelles-BARCELONA) in semi-automatic biochemical analyzer (Micro lab Instrument, Model: ARX-3 in 1).

Results and Discussion

The district-wise, month-wise, sex-wise and age-wise seroprevalence details are given in table 2. Out of 210 serum samples tested, 99 were found positive for PPR antibodies yielding an overall seroprevalence of 47.14 per cent in the goats of the Navsari and Valsad districts. Where Navsari district saw higher seroprevalence (60.44 %) compare to Valsad districts (23.68 %). Though Thakor *et al.*, (2016) and Sharma *et al.*, (2015) reported high prevalence of PPR in Valsad district of south Gujarat. Present study report might be due to variations in sample size, age, predominant management practices, humidity or season (Singh *et al.*, 2004).

In the present study, the seroprevalence of PPR disease was higher in female (56.20 %) than male (22.80%) and supported by earlier reports of El-Yuguda *et al.*, (2013), Mahajan *et al.*, (2013), Afera *et al.*, (2014), Nizamani *et al.*, (2015), Bello *et al.*, (2016) and Rahman *et al.*, (2016 and 2017). Contrary to these observations, sex wise seroprevalence of PPR was also reported higher in male than female (Thakor *et al.*, 2016). Higher prevalence in female than male in present study might be due to malnutrition, production and

reproduction stress which makes female more prone to infection.

Further, the seroprevalence was comparatively higher in November (90 %) followed by December (59.25%), January (52.17%) and August (11.11%) month. Mahajan *et al.*, (2013) also noted steady incidence of 50 per cent during the month November, December and January which increased in the month of February and March up to 100 per cent.

Similarly, Singh *et al.*, (2004) noted higher seroprevalence between the months of March and June. In the present study, higher prevalence in the November and December months might be due to increase demand of goats during festivals like Christmas and Bakra eid. To cop up the demand of chevon, goats were transported from Rajasthan to Gujarat and travelling of long distance was one of the main exciting cause for the occurrence of PPR.

The age-wise seroprevalence was 68 per cent and 36.36 per cent in <1 year and 1 to 3 years of age group, respectively, while no seropositivity was found in any one of goat having age more than 3 years.

Similarly, Mahajan *et al.*, (2013), Afera *et al.*, (2014), Bello *et al.*, (2016) and Thakor *et al.*, (2016) also opined young animals were more susceptible to PPR infection compare to adults animals. Among these, Begum *et al.*, (2016) and De *et al.*, (2016) reported higher seroprevalence rate in >6 months of age than <6months. However, Chauhan *et al.*, (2012), El-Yuguda *et al.*, (2013), Nizamani *et al.*, (2015) and Rahman *et al.*, (2017) have been reported higher seroprevalence in adult than young animals. The higher seroprevalence in younger animal might be due to sub-clinical load of coccidial/parasitic infection which causes immune-suppressive effect or *E. coli* infection causes fimbrial adhesion with intestinal mucosa which enhances effect of PPR virus (Kumar *et al.*, 2001).

Table.1 Hematological parameters in control and PPR infected goats (mean $\pm$ SE)

Sr. No.	Parameters	Seronegative (n=111)	Seropositive (n=99)	P value
Mean $\pm$ SE				
1.	Hb	8.34 $\pm$ 0.19	6.97 $\pm$ 0.17**	< 0.001
2.	PCV	22.39 $\pm$ 0.49	19.66 $\pm$ 0.48**	< 0.001
3.	TEC	13.06 $\pm$ 0.37	12.34 $\pm$ 0.31 ^{NS}	0.15
4.	TLC	11.45 $\pm$ 0.70	11.11 $\pm$ 0.52 ^{NS}	0.69
5.	DLC			
	Neutrophils	48.88 $\pm$ 1.60	49.45 $\pm$ 1.53 ^{NS}	0.79
	Eosinophils	1.28 $\pm$ 0.20	1.38 $\pm$ 0.25 ^{NS}	0.76
	Basophils	0.02 $\pm$ 0.02	0.00 $\pm$ 0 ^{NS}	0.34
	Monocytes	5.64 $\pm$ 0.42	3.83 $\pm$ 0.37*	< 0.01
	Lymphocytes	41.45 $\pm$ 1.61	45.36 $\pm$ 1.54 ^{NS}	0.08
6.	MCV	18.29 $\pm$ 0.50	16.30 $\pm$ 0.36*	< 0.01
7.	MCH	7.66 $\pm$ 0.84	6.61 $\pm$ 0.94 ^{NS}	0.40
8.	MCHC	36.30 $\pm$ 0.40	38.52 $\pm$ 3.45 ^{NS}	0.49

Note: ** -Highly significant at P< 0.001

* -Significant at P<0.01

^{NS} -Non significant at P < 0.01

Table.2 District, month, age and sex wise seroprevalence of PPR in goats

Particular	No. of samples	No. of samples Positive	Percentage of Positive samples
District			
Navsari	134	81	60.44
Valsad	76	18	23.68
Total	210	99	47.14
$\chi^2 = 24.84$ ** (p < 0.001)			
Months			
August	27	3	11.11
September	39	0	0
November	40	36	90
December	81	48	59.25
January	23	12	52.17
Total	210	99	47.14
$\chi^2 = 83.34$ ** (p < 0.001)			
Age			
<1 Year	75	51	68
1-3 Year	132	48	36.36
>3 Year	3	0	0
Total	210	99	47.14
$\chi^2 = 21.92$ ** (p < 0.001)			
Sex			
Male	57	13	22.80
Female	153	86	56.20
Total	210	99	47.14
$\chi^2 = 17.27$ (p < 0.001)			

Note: ** Significant at P < 0.001

Table.3 Various biochemical parameters in control and PPR infected goats (mean $\pm$ SE)

Sr. No.	Parameters	Seronegative (n=111)	Seropositive (n=99)	P value
Mean $\pm$ SE				
1.	Creatinine	1.06 $\pm$ 0.03	1.20 $\pm$ 0.02*	< 0.01
2.	ALP	201.17 $\pm$ 16.49	304.83 $\pm$ 36.98*	< 0.01
3.	AST	137.08 $\pm$ 5.32	122.56 $\pm$ 7.20 ^{NS}	0.10
4.	ALT	26.88 $\pm$ 1.81	34.53 $\pm$ 0.88**	< 0.001

Note: ** -Highly significant at P < 0.001

* -Significant at P < 0.01

^{NS} -Non significant at P < 0.01

The detail values (Mean $\pm$ S. E.) of various parameters are presented in table 1. In present study a total 210 blood samples were analysed for hematological analyses. Among them 99/210 blood samples were from seropositive goats and all the rest (111/210) were from seronegative goats. The mean $\pm$ SE values of individual parameters of seropositive goats compared with seronegative goats and interpretation of result shown significant decrease in Hb, PCV, monocytes and MCV value of seropositive group when compared with seronegative group.

Remaining other hematological parameters i.e. TEC, TLC, neutrophils, eosinophils, basophils, lymphocytes, MCH and MCHC did not show any significant variation between seropositive and seronegative group.

Ayatekin *et al.*, (2011), Das *et al.*, (2015) and Sharma *et al.*, (2015) also reported decreased values of Hb and PCV in PPR infected goats in their study. Besides these, MCV significantly decrease in seropositive groups when compare to seronegative group. But Ayatekin *et al.*, (2011) observed increased MCV values in seropositive group. Significantly decreased Hb and PCV values might be due to haemorrhages in various organs which may also results in anemic condition. Along with this monocytes also significantly decrease in seropositive group and supported the observation of Das *et al.*, (2015).

Total 210 serum samples were subjected to various biochemical parameters among them 99 samples were from seropositive goats and rest were from seronegative goats. Evaluated mean $\pm$ SE values of biochemical parameters were presented in table 3. Among biochemical parameters, ALT, ALP level and creatinine value were increased significantly in seropositive groups of animals. This is in

accordance with the observations of Sahinduran *et al.*, (2013).

Whereas, Ayatekin *et al.*, (2011) reported increased ALT and Das *et al.*, (2015) reported increased creatinine level only in serum of infected group.

Biochemical alteration in serum might be due to the infection of PPR virus which infect the organs and alter the function of liver and kidney (Das *et al.*, 2015).

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