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Research Article

SEROPREVALENCE OF PESTE DES PETITS RUMINANTS IN SHEEP AND GOATS IN AND AROUND HARYANA STATE

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ABSTRACT

The study presents sero-prevalence of peste des petits ruminants (PPR) in sheep and goat populations in Haryana and Delhi states. A total of 696 blood samples (499 from Haryana and 197 from Delhi) collected from sheep and goats between January, 2002 and December, 2004, were examined by competitive-ELISA for PPR antibodies. A total of 312 (44.82%) samples had PPR antibodies of which 55 (27.91%) were from Delhi state and 257 (51.50%) from Haryana state. Higher positivity was recorded in western districts of Haryana. Overall per cent positivity was significantly higher in sheep (54.62%) than goats (34.51%). Per cent positivity in sheep was significantly higher in older animals (≥ 2 years) while in goats, it was significantly higher in animals of 1-2 years age group (68.18%) as compared to other age groups. Since no vaccination at the time of collection of samples had been initiated in both the states, the sero-prevalence of 44.82% suggests that sheep and goat population in these states were exposed to circulating PPR virus.

Key words: Seroprevalence, PPR, sheep, goats

Peste des petits ruminants (PPR) is an acute, febrile, viral disease of small ruminants and is caused by RNA virus that belongs to the genus morbillivirus, family *Paramyxoviridae* and order *Mononegavirales* (Tober *et al.*, 1998). In India, the first outbreak of PPR was reported from Tamil Nadu in 1987 (Shaila *et al.*, 1989) and later on became endemic in other parts of the country (Joshi *et al.*, 1996, Nanda *et al.*, 1996, Nayak *et al.*, 1997, Aruni *et al.*, 1999, Dhand *et al.*, 2002). In order to know the circulation of virus in an area, sero-surveillance is required for which simple, rapid, specific and sensitive diagnostic methods should be employed. Monoclonal antibody based ELISA test is one of such methods. ELISA has been used by various workers for PPR studies in sheep and goats (Libeau *et al.*, 1992, Anderson and Mckay, 1994, Singh *et al.*, 2004). Serological studies of PPR have been carried out in different countries viz: Kenya and Uganda (Wamwayi *et al.*, 1995), Oman (Taylor *et al.*, 1990), Jordan (Lefevre *et al.*, 1991) and Turkey (Ozkul *et al.*, 2002). This paper describes seroprevalence studies carried out on sheep and goat population in Haryana and Delhi states.

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MATERIALS AND METHODS

Collection of samples: A total of 696 blood samples (499 from different districts of Haryana and 197 from Idgah Slaughter House, Delhi) from apparently healthy flocks of sheep and goats were collected during the period from January, 2003 to December, 2004 (Table 1). Serum was separated and stored at -20°C till further use. From each place in Haryana state, about 10% of the total population of a flock at random was sampled. A proforma was designed to get the epidemiological information regarding total number of animals in the flock, age of animals and vaccination status of sheep and goats against PPR.

Competitive ELISA: The serum samples were examined for PPR antibodies by competitive ELISA (c-ELISA) kit generously provided by Indian Veterinary Research Institute, Mukteswar. The test was employed as per protocol of Singh *et al.* (2004) who

Table 1
Blood samples collected from sheep and goats from different districts of Haryana

District	No. of flocks screened	Total sheep and goat population	Samples collected
Jhajjar	06	242	24
Sonepat	10	418	42
Fatehabad	13	729	73
Rohtak	12	579	55
Mahendergarh	18	968	96
Hisar	13	398	40
Sirsa	03	185	17
Yamunanagar	12	890	88
Karnal	07	304	29
Ambala	10	348	35
Total	**104**	**5061**	**499**

developed a monoclonal antibody based c-ELISA for sero-surveillance of PPR. The c-ELISA kit utilizes a monoclonal antibody directed against a neutralizing epitope of hemagglutinin protein (H) of PPR virus. The test is based on the inhibition of binding of monoclonal antibody to PPR virus antigen in the presence of the virus-specific antibody in the field sera. Competitive ELISA depends on the competition for binding of monoclonal antibody and antibody in the test serum to a common epitope of the antigen. The reduction in the binding of monoclonal antibody is indicated by reduced colour development which in turn indicates positivity of the serum samples. In the test reaction, the serum samples containing PPR antibodies were colourless, whereas the negative samples exhibited the development of light yellowish-brown colour. The test serum samples showing more than 40 per cent inhibition of mean OD values of the monoclonal antibody (Cm) wells were taken as positive for PPR antibodies (Singh *et al.*, 2004). Per cent inhibition (PI) was calculated as under:

PI = 100 - {(OD of test sample ÷ OD of Cm) ×100}

Statistcal analysis: The data was analyzed statistically by 't' test to know the variations with regards to species and age (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

A total of 696 serum samples of sheep and goats were collected from Haryana and Delhi states. Of these, 312 (44.82%) samples had PPR antibodies. Out of 197 serum samples collected from Delhi state, 55 (27.91%) were having antibodies against PPR, whereas, 257 (51.50%) samples from Haryana state had the antibodies (Table 2).

Per cent positivity in sheep and goats was in the following order: Highest in Sirsa district followed by Hisar, Fatehabad, Sonepat, Mahendergarh and Jhajjar. None of the samples from Ambala district had antibodies to PPR. It may be inferred from the data that sheep and goat populations in the western districts of Haryana bordering Rajasthan had seroconverted as most of the nomads from Rajasthan invariably move from one place to another in the western Haryana in search of food during the lean season in that state. Some of the flocks having PPR infection most likely spread the virus to other apparently healthy flocks along the track. This could be the reason for higher positivity in districts of western Haryana.

Of the 197 samples collected from Delhi state, 10 were of sheep and 187 of goats. 27.80% samples of goats had PPR antibodies, whereas only 3 (30.00%) samples of sheep were positive for PPR antibodies. In Haryana state, the positivity was 55.33% in sheep and 42.76% in goats (Table 2). Overall per cent positivity was also significantly more in sheep (54.62%) than goats (34.51%). In majority of the districts except Mahendergarh and Ambala, more number of samples were collected from sheep than goats. In sheep, the highest number of samples had antibodies against PPR in Hisar district followed by Sirsa, Fatehabad and others. Almost similar pattern was observed in goats.

Analysis of data in respect of different age groups revealed that a total of 29 (20.27%) sera from animals less than 1 year of age had PPR antibodies, whereas 38 (49.35%) and 245 (51.47%) from 1-2 year age group and more than 2 years, respectively had PPR antibodies. In sheep, 23 (41.81%) and 172 (57.33%) serum samples from 1-2 year age group and more than 2 year age group, respectively had antibodies against PPR. Per cent positivity in sheep was significantly more in older animals ($\geq$ 2 years).

Table 2
Prevalence of PPR antibodies in sheep and goats in Delhi and different district of Haryana

State	District	Sheep		Goat		Total	
		Samples tested	No. positive	Samples tested	No. positive	Samples tested	No. positive
Delhi	Delhi	10	3(30.00)	187	52 (27.80)	197	55 (27.91)
Haryana	Jhajjar	19	12 (63.15)	5	2 (40.00)	24	14 (58.33)
	Sonepat	27	19 (70.37)	15	12 (80.00)	42	31 (73.80)
	Fatehabad	66	52(78.78)	7	7 (100.00)	73	59 (80.82)
	Rohtak	42	18 (42.85)	13	6 (46.15)	55	24 (43.63)
	Mahendergarh	47	33 (70.21)	49	23 (46.93)	96	56 (58.33)
	Hisar	35	33(94.28)	5	4 (80.00)	40	37 (92.5)
	Sirsa	10	9 (90.00)	7	7 (100.00)	17	16 (94.11)
	Yamuna Nagar	64	9(14.06)	24	2 (8.33)	88	11 (12.5)
	Karnal	26	7(26.92)	3	2 (66.66)	29	9 (31.03)
	Ambala	11	0 (0.00)	24	0 (00.00)	35	0 (00.00)
	Total	**347**	**192 (55.33)**	**152**	**65 (42.76)**	**499**	**257 (51.50)**
	Grand total	**357**	**195 (54.62[a])**	**339**	**117 (34.51[b])**	**696**	**312 (44.82)**

Figure in parentheses indicate percentage, Different superscripts (a, b) indicate significant difference at 5% level of significance

In goats, 29 (20.56%), 15 (68.18%) and 73 (41.47%) samples from less than one year old, 1-2 years and more than 2 years old animals, respectively contained PPR-antibodies. Positivity in goats was significantly more in animals of 1-2 years age group (68.18%) as compared to other age groups.

Since rinderpest and PPR are closely related antigenically, certain conventional diagnostic techniques like agar gel precipitation test (AGPT), counter immunoelectrophoresis and indirect ELISA cannot differentiate between rinderpest and PPR (Obi and Patrick, 1984, Obi *et al.*, 1990). Although cross virus neutralization test can differentiate between antibodies to rinderpest and PPR, but it is laborious and cumbersome particularly when sample size is large. Libeau *et al.* (1992) developed a competitive ELISA (c-ELISA) which uses a monoclonal antibody against an epitope of N protein for the specific detection of rinderpest antibodies. Using MAbs directed against the hemagglutinin (H) protein of PPR and RP virus, Anderson and Mckay (1994) developed two different c-ELISAs to measure antibodies to either of the diseases. Ozkul *et al.* (2002) detected antibodies to PPR in 22.4% animals with higher prevalence in sheep than in goats. The latter observation supports the findings of the present study. Taylor *et al.* (1990) from Oman reported that approx. 29.15% serum samples of small ruminants contained PPR antibodies with higher prevalence in $\geq$ 2.5 years as compared to younger animals (1-2 years) in the households infected with PPR. However, in the households without disease, antibodies to PPR were detected in animals of more than 1.5 years of age. Sudharshana *et al.* (1995) tested 723 serum samples of sheep and goats and found overall prevalence of 36.52% in sheep and 58.73% in goats. On the contrary, Krishna *et al.* (2001) detected antibodies to PPR only in 2.98% of 672 serum samples collected from different locations in Andhra Pradesh.

Since no vaccination at the time of collection of samples had been initiated in both the states (Haryana and Delhi), the overall sero-prevalence of 44.82% suggests that sheep and goat population in these states were

exposed to circulating PPR virus. Since the sheep and goat population is raised by small and marginal farmers who had to suffer huge economic losses due to mortality and production losses, it is very essential that regular vaccination should be carried out.

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