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Seroprevalence Study on Goat Contagious Caprine Pleuropneumonia in Jabalpur, Madhya Pradesh

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ABSTRACT

The present study highlights the seroprevalence of contagious caprine pleuropneumonia (CCPP) in goats using slide agglutination test. A total of 1427 serum samples from goats belonging to Jabalpur district of Mahakaushal region of Madhya Pradesh were screened over a period of one year (i.e. April 2014 to March 2015). All the samples were screened for CCPP antibodies by slide agglutination test (SAT) using colored CCPP antigen. The overall seroprevalence of contagious caprine pleuropneumonia in goats was 10.65 per cent (152 out of 1427 goats). Seroprevalence of CCPP in organised goatry was higher (i.e. 13.54 %) than the unorganised sector of goatry (i.e. 9.01 %). Sex wise seroprevalence was marginally higher in female (10.67 %) than the male (10.61 %). SAT for CCPP detection using colored antigen was found to be quick, simple and low cost with ease of application in field condition without the need of any specialized training and equipments.

Keywords: Contagious caprine pleuropneumonia (CCPP), *Mycoplasma capricolum* subsp. *capripneumoniae* (Mccp), Seroprevalence, Slide agglutination test (SAT)

Contagious caprine pleuropneumonia (CCPP), one of the most serious and dramatic disease of goats, is caused by *Mycoplasma capricolum* subsp. *capripneumoniae* (Mccp) and is characterized by fever, coughing, severe respiratory distress, lying down for prolonged periods and in the terminal stages, mouth breathing, tongue protrusion and frothy salivation with death in two or more days and occasionally, the only sign seen is sudden death. CCPP causes high mortality rate up to 80% and morbidity rate up to 100%. The direct losses of the disease result from its high mortality, reduced milk production and meat yield, cost of treatment, control, disease diagnosis and surveillance. In addition to these, there are indirect losses due to the imposition of trade restrictions (DaMassa *et al.*, 1992).

Although the significance of CCPP is well known, there are reports on prevalence of CCPP in many parts of our country but no work has been carried out to establish its prevalence in Madhya Pradesh. The livestock in M.P. have a high probability of picking up the infection due to inter-state migration of livestock. Serological investigation is preferred for assessing the prevalence of disease. Keeping the above facts in mind, the present study was undertaken to determine the prevalence of CCPP in goats in Mahakaushal region of Madhya Pradesh.

MATERIALS AND METHODS

To study the seroprevalence of CCPP in goats, a total of 1427 serum sample of goats belonging to organized sector of goatry (Goat farm, Amanala; ILFC, Adhartal and Yadav goat farm, Chhoti Pipariya) as well as goats from unorganized sector viz. clinical cases brought to Teaching Veterinary Clinical Complex, Veterinary College, Jabalpur and nearby villages of Jabalpur district,

Mahakaushal region (M.P.) were screened over a period of one year i.e. from April 2014 to March 2015. All the serum samples were harvested by collecting about 3 ml of blood aseptically from the jugular vein in clot activator vaccutainers and allowing to stand for about two hours. The serum thus collected was frozen at –20°C until further use. The serum samples were screened for CCPP antibodies by slide agglutination test (SAT) using colored CCPP antigen.

For performing SAT, the coloured antigen was procured from the Department of Bacteriology and Mycology, Division of Indian Veterinary Research Institute (I.V.R.I.), Izatnagar (U.P). The SAT was performed as per the method described by Roy *et al*. (2010). Precisely, one drop (0.03 ml) of test serum was taken on a clean grease free glass slide by micropipette. The antigen bottle was shaken well to ensure homogenous suspension and one drop (0.03 ml) of whole cell coloured antigen was added to the drop of test serum. The antigen and serum were mixed thoroughly with a tooth pick and the slide was rotated for 1 to 2 minutes. The result was read after 2 to 3 minute. Positive result was indicated by definite clumping while in case of negative reaction, mixture remained homogeneous without formation of any clumps.

Overall seroprevalence of CCPP was calculated by dividing the number of positive samples by the total number of samples. Age wise and breed wise prevalence were calculated by category wise dividing the number of positive samples by the total number of samples (Thrusfield, 2004). Analysis of data of prevalence studies was done by Chi-square test.

RESULTS AND DISCUSSION

Overall Seroprevalence of CCPP

The overall seroprevalence of CCPP in goat population during April 2014 to March 2015 was 10.65 % (152 out of 1427 goats). The finding in the present study was in line with reports of Udit and Chand (2008) who reported 10.5 % in Uttar Pradesh and Bekele *et al*. (2011) who reported 13.2 % in Ehtiopia. However, a relatively higher seroprevalence of 33.67 % (Ingle *et al*., 2008) in Nagpur district of Vidarbha region and 32.68 % (Hadush *et al*., 2009) in Nothern Ethopia was reported.

The variation in the seroprevalence of CCPP reported from different studies may be as a result of the temporal and spatial factors associated with sampling, the situation of the disease during the time of sampling and the variation in the specificity and sensitivity of the different serological tests employed.

Seroprevalence of CCPP in organized and unorganized goatry

Seroprevalence of CCPP in organized goatry was higher (13.54 %) than unorganized sector of goatry (9.01 %). Significant variation was noticed in the seroprevalence with respect to rearing pattern of goatry. The results of this study are in line with findings of Ravishankar *et al*. (2011) who have recorded a high seroprevalence in private organized farms. The results are in accordance with the previous studies indicating a higher prevalence in organized goatry. CCPP is a highly contagious disease with high morbidity (80-100%) which spreads mainly by aerosol and also by ingestion of feed, water or milk contaminated with infected milk, urine, faeces, nasal, ocular and genital discharges. Therefore, when animals are reared under intensive system, they come in close contact with each other resulting in development of clinical form of infection while, traditional extensive system of rearing results only in sporadic cases of the disease. This may be explained by the fact that the infection needs proximity to source of infection and increasing number of susceptible population.

Table 1: Seroprevalence of CCPP in organized and unorganized goatry

Rearing Pattern	Goats screened	Goats positive	Prevalence (%)
Organized goatry	517	70	13.54
Unorganized goatry	910	82	9.01

$\chi 2 = 5.675$ df = 01 p = 0.017208

In contrarst to the present findings, Dinesh *et al*. (2013) reported significantly lower seroprevalence of 15.97 % in goats raised in government organized farms than the prevalence in farmer's herd which stood at 43.9 %. Similarly, in Uttar Pradesh, 20% seroprevalence was reported at government organized farms as compared to 38.46 % in farmer's herd. The probable reason for a low

prevalence in government organized farms could be due to consistent maximum adherence to veterinary, hygienic and husbandry measures under the supervision of veterinarians there by reducing the possibility of contacting and/or spreading infection in the government organized farms.

Sex wise prevalence of CCPP in goats

Sex wise seroprevalence of CCPP was marginally higher in female (10.67%) than the male (10.61%). However, no significant variation was noticed in the sex wise seroprevalence.

This difference is by chance and not a real difference. The findings of Abegunde *et al*. (1981) also correlate with this work who has also found higher (16.1%) prevalence of mycoplasmosis in female goats as compared to males where prevalence was only 10.7%. These findings also correlate with the work of Bekele *et al.* (2011), who recorded 14% seroprevalence in females and 11.6% in males. On the contrary, Suryawanshi *et al*. (2015) recorded higher prevalence of CCPP in males (35.71%) than in females (17.14%).

Scanty literature is available with regards to sex wise prevalence of contagious caprine pleuropneumonia. No significant difference in sex wise prevalence of CCPP in the present study might be attributed to the fact that there is no predilection of Mccp for either sex.

Table 2: Sex wise prevalence of CCPP in goats using slide agglutination test

Sex	Goats screened	Goats positive	Prevalence (%)
Male	537	57	10.61
Female	890	95	10.67

$\chi 2 = 0.001$ df = 01 p = 0.97464

Age wise seroprevalence of CCPP

The age wise seroprevalence of CCPP in goats revealed highest prevalence i.e. 10.67 % in the goats of above 12 months of age followed by 10.64% prevalence in goats of less than 6 months of age and lowest prevalence i.e. 10.59 % in goats of 6-12 months of age. The results of this study are in partial agreement with findings of Bekele *et al.* (2011), who have recorded seroprevalence of 9.2%, 11.0 % and 34.8% in young (<2 years), adult age (2-5 years) and old age (>5 years), respectively. Suryawanshi *et al*. (2015) also revealed higher prevalence i.e. 23.08 % in 2-3 years age groups of goats.

Although scanty literature is available with regards to age wise prevalence of contagious caprine pleuropneumonia, no significant difference in age wise prevalence of CCPP in the present study might be attributed to the fact that there is no predilection of age group for CCPP.

The different authors have indicated that as the goats gets older; they are more susceptible to infection. Moreover, they also tend to be infected repeatedly. Therefore, the probability to be seropositive in older ages for CCPP would be high as compared to kid and young goats. However, there was also a report that suggested absence of age factor in CCPP epidemiology (Hadush *et al*., 2009).

Table 3: Age wise seroprevalence of CCPP in goats

Age group	Goats screened	Goats positive	Prevalence (%)
< 6 months	432	46	10.64
6 –12 months	302	32	10.59
> 12 months	693	74	10.67

$\chi 2 = 0.0012$ df = 02 p = 0.999394

Breed wise seroprevalence of CCPP

The breed wise seroprevalence of CCPP in goats revealed a highest prevalence of 20.00 % in Black Bengal followed by 13.71% in Jamunapari, 13.67% in Barbari, 10.38% in Sirohi and lowest prevalence of 9.48% in non-descript goats. The breed wise seroprevalence of CCPP showed non significant variation. The findings of present study is in similar pattern with the work of Dinesh *et al*. (2013) who reported seroprevalence of mycoplasma as 15.38%, 16.67% and 20%, respectively in Malabari, Attapadi Black and nondescript goats reared in the government farms. There are several reports on breed differences for mycoplasma infection in goats. Bergonier *et al*. (1997) stated that firm conclusions cannot be drawn regarding the variations in susceptibility attributable to breed. The results of present study are in correlation with the previous

investigations. The variability in breed wise prevalence might be due to the variability in the number of samples examined in each category.

Table 4: Breed wise seroprevalence of CCPP in goats

Breed	Goats screened	Goats positive	Prevalence (%)
Barbari	117	16	13.67
Black Bengal	40	08	20.00
Jamunapari	124	17	13.71
Sirohi	260	27	10.38
Non-descript	886	84	09.48

$\chi 2 = 5.6329$ df = 04 p = 0.228295

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