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Seroprevalence of Infectious Bovine Rhinotracheitis in Dairy Animals with Reproductive Disorders in Uttar Pradesh, India

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Abstract: Respiratory and reproductive disorders in dairy animals due to various etiological agents have led to significant economic losses to dairy industry. These losses are due to abortions, metritis, retention of placenta, repeat breeding, death of animals, loss of production and trade restrictions etc. The objectives of this cross-sectional study were to detect the seroprevalence of infectious bovine rhinotracheitis (IBR, BHV-1) in dairy animals of western parts of Uttar Pradesh, India. Anti BHV-1 antibodies were measured using a commercial ELISA kit (SYANOVIR® IBR-Ab). Blood samples were collected from a total of 134 animals of different age, gender from 8 districts. Overall individual seroprevalence was 32.84%. The study revealed that BHV-1 is comparatively more widespread in cattle (46.51%) than buffalo (35.28%). Comparison of different sex groups of animals revealed that the higher numbers of infected animals were identified in male (48.00%) than female (29.35%). The seropositivity of IBR increased with age of animals. The highest prevalence of IBR (66.67%) was observed in animals aged more than 8 years. As vaccination against IBR is not practiced in the region and higher percent positivity (>20%) in all age group of animals indicated the natural circulation of BHV-1 virus in the population. Because of less awareness on the vaccination of animals against this virus, the disease may spread rapidly. The results of present study also indicate that strict monitoring and surveillance of IBR is need of today to protect the animals from infection and further spread.

Key words: IBR, BHV-1, seroprevalence, cattle, buffalo, Uttar Pradesh

INTRODUCTION

Respiratory and reproductive disorders in dairy animals due to various etiological agents like Bovine Viral Diarrhea Virus (BVDV), bovine herpesvirus-1 (BHV-1), *Mycoplasma, Brucella, Leptospira, Listeria* etc. have led to significant economic losses. These losses are due to abortions, metritis, retention of placenta, repeat breeding, death of animals, loss of production and trade restrictions etc. (Kumar *et al.*, 2009, 2011; Raizman *et al.*, 2011; Verma *et al.*, 2012). Infectious Bovine Rhinotrachitis (IBR), caused by Bovine herpesvirus-1 (BoHV-1), a member of the genus *Varicellovirus*, family Herpesviridae, subfamily Alphaherpesvirinae, is a highly contagious disease of animals. The disease occurs in a variety of syndrome such as Infectious Bovine Rhinotracheitis (IBR), Infectious Pustular Vulvovaginitis (IPV), infectious pustular balanoposthitis (IBP), abortion, conjunctivitis, encephalitis and generalized symptoms in young calves

(Lata *et al.*, 2009; Nandi *et al.*, 2009; Jacevicius *et al.*, 2010; Raizman *et al.*, 2011; Raaperi *et al.*, 2012). The disease is clinically characterized by inflammation of respiratory and genital tract and abortion. In young calves various organs may be affected by systemic infection of the virus. To effectively control this disease, screening, surveillance and monitoring along with vaccination is important but unfortunately no exact data is available for its status in many of the countries including India (Raizman *et al.*, 2011). Since India is the largest producer of milk in the world, so the IBR infection in India is also assumed a great importance. The disease was first time reported in India from Uttar Pradesh (Mehrotra *et al.*, 1976) and since then many studies have been conducted in different parts of India (Renukaradhya *et al.*, 1996; Rajkhowa *et al.*, 2004; Nandi *et al.*, 2011) viz., Bihar (Singh and Sinha, 2006), Gujrat (Lata *et al.*, 2008), Andaman and Nicobar islands (Sunder *et al.*, 2005) and West Bengal (Ganguly *et al.*, 2008) etc. However, scanty

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of information is available for Uttar Pradesh state. Therefore, the objectives of this cross-sectional study were to detect the anti BHV-1 antibodies in the sera of cattle and buffaloes of Uttar Pradesh, India.

MATERIALS AND METHODS

Study area: The study area was various districts (Agra, Amroha, Baghpat, Bijnor, Ghaziabad, Hathras, Mathura and Moradabad) of Uttar Pradesh, India (Fig. 1). The climate of the state is humid subtropical with dry winter type. The meteorological parameters of the area is as follows:the average annual temperature (11.0 to 36.9°C); annual rainfall (650-1000 mm), relative humidity (20-50%), predominant vegetation is tropical dry deciduous forest. The predominant economic activity is agriculture along with animal rearing. The main cattle breeds are Zebu, Brahaman and crossbreds, while the main buffalo breeds are Murrah. For seroprevalence study, the individual animal was the research unit.

Sampling: In the present study, blood samples from 134 animals with the history of reproductive disorders as abortions, repeat breeding, retention of placenta and metritis and calves in near vicinity to those animals including 43 cattle and 91 buffaloes (of various sex, age and districts) were collected during 2011-2012 and 2012-2013. About 5 mL of blood was collected from the juglar vein of each animal using sterilized disposable syringe and needles. Samples were brought to laboratory on ice and kept there for 6-8 h and thereafter centrifuged at 3000 rpm for 15 min to obtain the serum. Serum samples were collected and stored in labelled vials at -20°C till use.

Serological test: The serological testing of sera samples was performed at the Departments of Veterinary Epidemiology and Preventive Medicine, Uttar Pradesh Pandit Deen Dayal Upadhayay Pashu Chikitsa Vigyan Vishvidhyalaya Evum Go-Anusandhan Sansthan (DUVASU), Mathura, India. Commercial standardised ELISA kits (SYANOVIR® IBR-Ab ELISA kit, Sweden) were used for the detection of anti BHV 1 antibodies. The testing was conducted as per the protocol given by manufacturer.

Statistical analysis: All the statistical significance of the differences between prevalence percentages were calculated at 95% probability using the standard procedures.
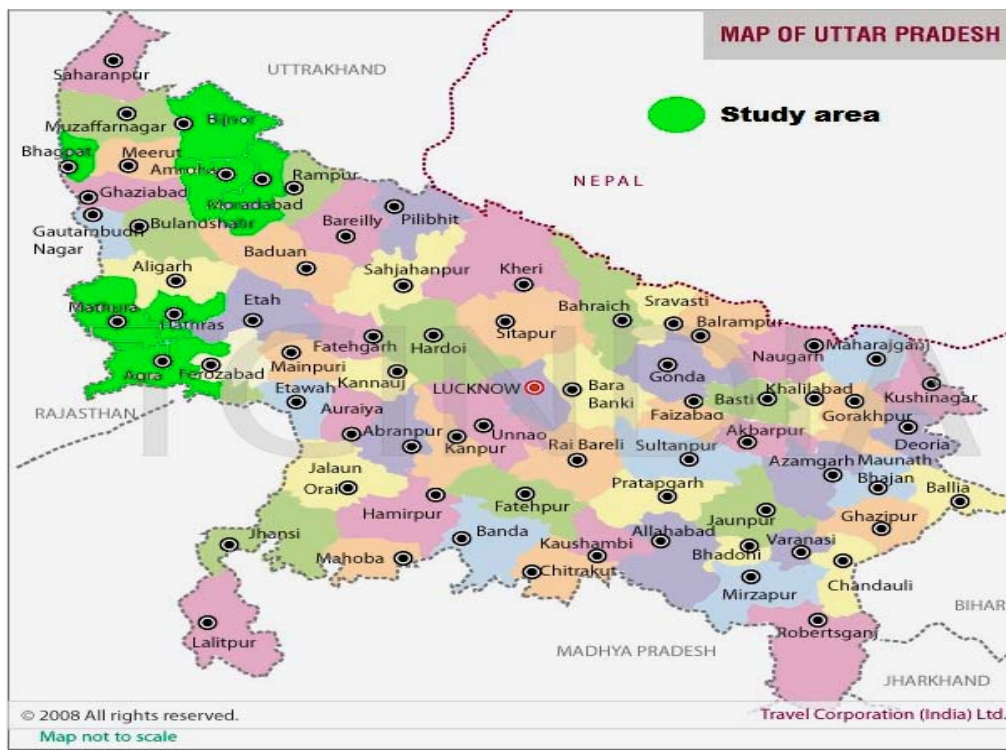

Fig. 1: Uttar Pradesh State map showing the districts of study for serosurveillance of IBR

RESULTS AND DISCUSSION

A total of 134 animals (43 cattle and 91 buffalo) from 08 districts of western Uttar Pradesh were sampled and screened for the presence of anti BHV-1 antibodies using ELISA test. Out of 134 serum samples screened, 44 (32.84%) of them exhibited positive reaction (Table 1-3). The high seropositivity of animals against IBR is probably due to lack of control measures towards this infection. The result obtained in the study was within the range 14.75 to 68.90% as reported in previous studies like Singh and Sinha (2006), Ganguly *et al.* (2008), Lata *et al.* (2008) and Nandi *et al.* (2011) conducted in other states of India like Bihar, West Bengal, Gujrat, Aasam, Madhya Pradesh etc. The percent positivity was higher in cattle (48.84%) than that of in buffaloes (35.28%). The possible reason for higher seropositivity in cattle might be due to the inclusion of crossbred animals of cattle species in the study and the involvement of artificial insemination in cattle breeding. The animals were categorised according to age. Lowest seroprevalence was found in age group below two years of age and highest in the age group above 8 years of age. The age wise percent positivity increased with age (Fig. 2), which is in accordance to the results reported by earlier studies (Singh and Sinha, 2006; Ganguly *et al.*, 2008). The possible reason may be increased susceptibility of animals with age or repeated subclinical infection with the virus that boost to keep the antibody titre higher enough to be detected positive or decrease in immunity and increase in stress, which may lead to reactivation of latent virus (Singh and Sinha, 2006). Generally all the members of Herpesviridae family has the chances to infect their host as latent infection as a sequel to primary infection (Nandi *et al.*, 2009). The percent positivity was higher in male animals (48.00%) in comparison to that of female animals (29.35%). This might be due to behaviour of male animals as they used to lick the discharges, which is the good source of infection, from female genitalia and also the exposure to more number of females and that to during the estrous or post abortion period or post parturition estrous when there are more chances of virus excretion in discharges. This variation in place wise (district wise) percent positivity (8.33 to 62.50%) is very much expected and has been observed in other states too like West Bengal (Ganguly *et al.*, 2008). The disease occurs to be more prevalent in areas of intensive animal husbandry practices such as organized farms (Ganguly *et al.*, 2008). The present study is based on limited number of serum samples from eight district of Uttar Pradesh, India. However, the results are indicative of circulation of

Bovine Herpes virus in the state, thus further systemic epidemiological studies are warranted to know the true

Table 1: Seroprevalence of IBR in dairy animals considering different parameters

Parameters	Total animals	Total positive	Percent positive
Species			
Cattle	43	21	48.84
Buffalo	91	23	35.28
Sex			
Male	25	12	48.00
Female	109	32	29.35
Total	134	44	32.84
Age			
<2 years	31	7	22.58
2-5 years	64	24	37.50
5-8 years	36	11	30.55
>8 years	03	2	66.67
Districts			
Agra	18	8	44.44
Amroha	21	3	14.28
Baghpat	26	13	50.00
Bijnor	08	5	62.50
Ghazaiabad	12	1	8.33
Hathras	12	2	16.67
Mathura	18	5	27.78
Moradabad	19	7	36.84

Table 2: Seroprevalence of IBR in cattle considering different parameters

Parameters	Total animals	Total positive	Percent positive
Sex			
Male	7	4	57.14
Female	36	17	44.44
Total	43	21	47.22
Age			
<2 years	6	2	33.33
2-5 years	27	13	48.15
5-8 years	09	05	55.56
>8 years	1	1	100.00
Districts			
Agra	9	7	77.78
Amroha	2	0	0.00
Baghpat	14	8	57.14
Bijnor	4	3	75.00
Hathras	2	1	50.00
Mathura	6	1	16.67
Moradabad	6	1	16.67

Table 3: Seroprevalence of IBR in buffalo considering different parameters

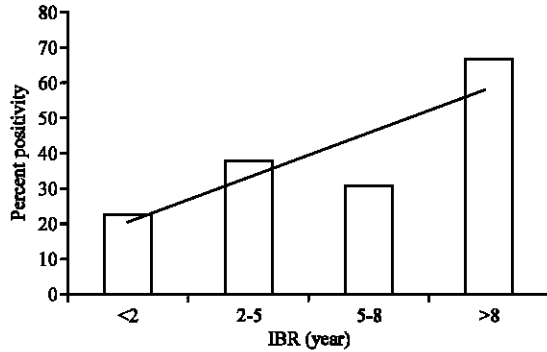| Parameters	Total animals	Total positive	Percent positive
Sex			
Male	18	8	44.44
Female	73	15	20.54
Total	91	23	25.28
Age			
<2 years	25	5	20.00
2-5 years	37	11	29.73
5-8 years	27	6	22.22
>8 years	2	1	50.00
Districts			
Agra	9	1	11.11
Amroha	19	3	15.79
Baghpat	12	5	41.67
Bijnor	4	2	50.00
Ghazaiabad	12	1	8.33
Hathras	10	1	10.00
Mathura	12	4	33.33
Moradabad	13	6	46.15

Fig. 2: IBR seroprevalence dynamics in age groups of dairy animals (cattle and buffalo)

status of disease in Uttar Pradesh state so that further necessary action can be taken to formulate the control strategies.

CONCLUSION

The present study clearly showed the widespread sero-positive cases of IBR in various districts of western parts of Uttar Pradesh. As vaccination against IBR is not practiced in the region and higher percent positivity (>20%) in all age group of animals indicates the natural circulation of BHV-1 virus in the population. As the disease affect the reproductive function of the animals, thus may cause a significant economic losses to dairy industry. Because of less awareness on the vaccination of animals against this virus, the disease may spread rapidly. The results of present study also indicate that strict monitoring and surveillance of IBR is need of today to protect the animals from infection and further spread.

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