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Seroprevalence of Bovine Herpes Virus Type 1 in Cattle and Buffaloes from Chhattisgarh

Devprabha Samrath[1], Sanjay Shakya[2], Nidhi Rawat[1*], Varsha Rani Gilhare[1], Fateh Singh[3] and Foziya Farzeen Khan[1]

[1]Department of Veterinary Microbiology, College of Veterinary Science and Animal Husbandry, Anjora Durg, Chhattisgarh, INDIA
[2]Department of Veterinary Public Health and Epidemiology, College of Veterinary Science and Animal Husbandry, Anjora Durg, Chhattisgarh, INDIA
[3]ICAR-National Institute of High Security Animal Diseases, Bhopal, Madhya Pradesh, INDIA

**Corresponding authors: N Rawat; Email: dr_nidhirawat@yahoo.com*

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ABSTRACT

Present study was carried out to know the seroprevalence of BHV-1 in the population of cattle and buffaloes from Chhattisgarh, India. A total of 464 serum samples were collected from cattle and buffaloes of different districts in Chhattisgarh. The collected serum samples were screened by Avidin-Biotin Enzyme Linked Immunosorbent Assay kit that recorded an overall seroprevalence of 34.69%. Out of 422 cattle serum samples, 158 (37.44%) were found positive compared to 3 (7.14%) serum samples out of 42 from buffaloes. In different age groups, there was variability in prevalence of BHV-1. Animals above 9 years of age showed the highest seropositivity (45.9%) whereas young animals between 0 to 2 years of age showed the minimum seropositivity (6.89%). Crossbred cattle showed higher seropositivity (40.42%) followed by non-descript cattle whereas indigenous cattle showed the seropositivity of 39.77% and 22.03%, respectively. Murrah, Nagpuri and indigenous buffaloes showed seropositivity of 0%, 3.03% and 50%, respectively. In the present study, seropositivity of 36.53% and 37.56% was recorded in male and female cattle, respectively. Male and female buffalo showed 11.11% and 6.06% seropositivity, respectively. Seropositivity of 45.45% was recorded in animals without clinical signs whereas animals with history of different clinical conditions showed 24.46% seropositivity. Rhinotracheitis, pustularvulvovaginitis, mastitis and balanoposthitis were the main clinical findings associated with the selected in research trial animals.

Keywords: Seroprevalence, bovine herpes virus-1, cattle, buffaloes

Bovine herpesvirus type 1, an important pathogen of cattle, reported worldwide comes under the genus *Varicellovirus*, *Alphaherpesvirinae* subfamily of *Herpesviridae* family (Biswas *et al.,* 2013). Nucleocapsid of herpes virus is enveloped with icosahedral symmetry composed of 162 capsomers. The genome of the virus is linear and made up of double-stranded DNA of 125 to 290 kbp in size (Maclachlan and Dubovi, 2011). The virus causes enormous economic losses to livestock industry by decreasing milk production and abortion. The virus causes a variety of clinical symptoms include rhinotracheitis, balanoposthitis, vulvovaginitis, abortion and encephalitis (Verma *et al.,* 2014). Moreover in cattle, infection results in conjunctivitis, acute gastroenteritis, mastitis and repeat breeding (Jacevicius *et al.,* 2010). Generally the cattle above 6 months of age are affected by BHV-1 when maternal immunity has declined (Bennett and Ijpelaar, 2003). The BHV-1 infection occurs during direct contact between animals via respiratory, ocular or genital secretions. Frozen semen from infected bulls and contaminated equipments are another potential source of infection (Muylkens *et al.,* 2007). The virus is excreted through nasal and ocular secretion, semen and aborted placenta. Subsequent to an acute infection, the virus gets latent in the sensory ganglia of the animal (OIE, 2010). BHV-1 induces immune suppression in cattle (Jones, 2009) which leads to secondary bacterial infections; as a result BHV-1 is an important cofactor in the bovine respiratory disease complex has immense financial impacts (Biswas *et al.,* 2013). Disease caused by BHV-1 is in list B of the

Office International Des Epizootics (OIE). An attempt was made to investigate the seroprevelance of the BHV-1in cattle and buffaloes in various district of Chhattisgarh, India.

MATERIALS AND METHODS

Seroprevalence

A total of 464 blood samples were collected from the cattle and buffaloes of various districts of Chhattisgarh and serum was separated out and stored at -20ºC till further used. Serum samples were tested for the presence of antibodies against BHV-1 using A-B ELISA kit procured from ICAR-National Institute of Veterinary Epidemiology and Disease Informatics, Bengaluru (previously PD-ADMAS). Animals were categorized on the basis of species, breed, sex, age, and health status.

Observation: Absorbance values were recorded at 492 nm wavelength. BHV-1 antibody concentration was calculated as the percentage of the strong positive serum (PP).

RESULTS AND DISCUSSION

Seroprevalance of BHV-1 in Various Districts of Chhattisgarh

Out of total 464 serum samples, 161 samples were found positive with an overall seroprevalance of 34.69%. More or less similar result were obtained using ELISA on serum samples of cattle and buffaloes from different states including 27.4% in Andhra Pradesh (Sarumathi *et al.*, 2002), 22.22% in Pantnagar (Raghuvanshi and Kumar, 2003) and 30% in Gujarat (Jain *et al.*, 2009). Seropositivity of 12.22% for IBR antibodies highlighted the circulation of virus among the livestock population of Odisha (Das *et al.*, 2014). In Uttar Pradesh, the BHV-1 was more prevalent in organized herds (43.3%) than the unorganized herd (13.2%) with an overall prevalence of 32.31% among animals with history of reproductive disorders (Singh and Yadav, 2010). In organized herds, overcrowding, improper management and unhygienic practices might be the predisposing factors for BHV-1 infection.

Species-wise Seroprevalance of BHV-1

One hundred fifty eight samples were found positive out of 422 samples in cattle population and 3 samples out of 42 in buffalo population. Thus the cattle population was showing the higher seroprivalence (37.44%) than the buffaloes (7.14%). The higher seroprevalence in cattle than in buffaloes was also reported by various other scientists in India. In Panjab, seroprevelance in cattle and buffaloes was 34.16% and 17.8%, respectively (Dhand *et al.*, 2002) while the seroprevelance of 10.75% in cattle and 8.89% in buffaloes was reported from Uttarakhand State (Jain *et al.*, 2006). Similarly, Khan (2004) in Gujarat reported species-wise higher seroprevalence of 23.4% in cattle as compared to 18.97% in buffaloes by i-ELISA.

Age-wise Seroprevalance of BHV-1

Among different age groups, there was variability in prevalence of BHV-1. In 0 to 2 years age group, 2 out of 20 cattle samples were positive, whereas, no any sample was positive out of 9 buffaloes in this age group. Similarly, in 2 to 5 years age groups, 35 out of 146 in cattle and 1 out of 12 in buffaloes, in 5 to 8 years age group, 93 out of 201 in cattle and 1 of 15 in buffaloes and in more than 9 years age group 28 out of 55 in cattle and one out of 6 in buffaloes were found positive for IBR antibodies. The seroprevalence of BHV-1 was highest in cattle (50.9%) followed by buffaloes (16.66%) in more than 9 years of age followed by 5 to 8 years age group (cattle 46.26 % and buffaloes 6.66%), 2 to 5 years (cattle 23.97% and buffaloes 8.33%) and 0 to 2 years (cattle 10% and buffaloes 0%). Age-wise analysis of data revealed an increasing trend in the seroprevalence of BHV-1 with advancement of age in the cattle and buffaloes. Animals were showing highest seroprevalence of 45.9% with the age of 9 years and above whereas the young animals between 0 to 2 years of age were showing minimum seropositivity of 6.89% (2 animals positive out of 29 cattle and buffaloes) for BHV-1. There was an increasing tendency for disease to occur with advancement of age, corroborate with the findings of Sharma *et al.* (2006) who recorded 66.7% seroprevalence of IBR in cattle of more than 9 years of age followed by 6 to 8 years age group (62.5%), 4 to 6 years (52.17%), 2 to 4 years (42.85%) and 0 to 2 years (35.71%) in Himachal Pradesh. Higher seropositivity in older animals might be due to the ability of virus to become latent following

primary infection and its reactivation under stress or old age and in immunosuppressed status. Similar observation was also reported by Jain *et al.* (2006). They detected highest seroprevalence of 10.39% in animals above 9 years of age whereas young cattle between 0 to 2 years of age showed the minimum seropositivity of 2.27% in Uttarakhand.

Breed-wise Seroprevalance of BHV-1

A total of 107 (39.77%) samples were found positive out of 269 serum samples collected from non-descript cattle. In indigenous cattle, 56 (23.21%) serum samples were found positive from sahiwal cattle, whereas, no any positive sample recorded from Gir cattle (13). The mean seropositivity in such cattle was 22.03%. In crossbred cattle, 5 Jersey breed animals out of 18 (27.77%) and in Holstein Friesian 33 out of 76 (43.42%) serum samples were found positive. The mean seropositivity in exotic cattle was 40.42%. In Murrah buffalo, zero out of 5 (0), in Nagpuri one out of 33 (3.03%) and in Indigenous buffaloes 2 out of 4 (50%) serum samples were found positive. Thus, it is apparent that prevalence of BHV-1 antibodies in Chhattisgarh was more in crossbred cattle (40.42%) compared to indigenous (22.03%) and nondescript cattle (39.77%). This difference might be attributed to their exotic germplasm, which renders them more susceptible to diseases and environmental stress factors. Conversely, the lower prevalence rate among indigenous and non-descript animals might be due to their relatively high resistance to diseases and better adaptation to the environmental conditions. Similar observation was made by (Deka *et al.*, 2005) who reported higher seropositive rate of Jersey (75%) and Holstein Friesian bulls (84.6%) than that of cross bred (37.5%) bulls in Panjab State. Similarly, Koppad *et al.* (2007) found higher seropositivity of IBR in Holstein Friesian breed (21%) and slightly lower prevalence in Jersey cows (17.8%) in Karnataka State.

Sex-wise Seroprevalance of BHV-1

In present study, 19 out of 52 male and 139 out of 370 female cattle and one out of 9 male and two out of 33 female buffaloes were found positive. Overall, 141 (34.98%) female animals were found positive out of 403 animals and out of 61 male animals, 20 (32.78%) animals were found positive for IBR. Similar observations were also reported by Nandi *et al.* (2007) who observed 66% seropositivity in female and 38% in male cattle from Jhansi. Similarly, Sharma *et al.* (2006) reported higher seroprevalence of IBR in female cattle (56.92%) compared to male (20%) cattle from Himachal Pradesh. Contrary to it, Dhand *et al.* (2002) noticed higher seroprevalence of IBR in males probably due to use of contaminated semen resulted in a variety of genital tract disorders.

Seroprevalance of BHV-1 in Cattle and Buffaloes Associated with Different Clinical Conditions

During the present study, 103 out of 231 (44.58%) serum samples screened from the animals without clinical signs were found positive, whereas, 58 (24.9%) out of 233 samples collected from animals with history of different clinical conditions, showed positivity. The highest percentage of seropositivity was 50% in animals with conjunctivitis and rhinitis followed by 39.43% with repeat breeding, 30% with infertility, 25% with rhinitis, 22.22% with abortion, 18.51% with anoestrus, 18.18% with conjunctivitis and 11.11% with retention of placenta in association to abortion. Similarly, Rajesh *et al.* (2003) recorded 20%, 25%, 26.7%, 11% and 29.7% seroprevalence of IBR from animals with history of abortion, retention of placenta, metritis and cervicitis, anoestrus and sub-oestrum and repeat breeding, respectively, from Kerala. Contrary, Koppad *et al.* (2007) observed highest seroprevalence in animals with history of infertility and abortions (57.1%) when compared to normal population without history (45.9%) of clinical condition in Karnataka. The higher seroprevalence in animals without history of disease might be due to the persistence of virus in a latent from probably after the establishment of infection in the calf hood (St. George *et al.*, 1967).

CONCLUSION

Seroprevalence of BHV-1 in bovines from Chhattisgarh, India was 34.69% detected by A-B ELISA test. Out of 422 cattle serum samples, 158 (37.44%) were found positive and 3 (7.14%) samples out of 42 buffalo serum samples showed positivity. In different age groups, there was variability in prevalence of BHV-1. The animals aged 9 years and above were showing the highest seroprevalence (45.9%), whereas, young animals between 0 to 2 years of age showed minimum seropositivity of 6.89%. Crossbred

cattle showed higher seropositivity of 40.42% followed by non-descript (39.77%) and indigenous (22.03%) cattle. Murrah, Nagpuri and Indigenous buffaloes showed 0, 3.03% and 50% seropositivity, respectively. Seropositivity of 36.53% and 37.56% was recorded in male and female cattle compared to11.11% and 6.06% in male and female buffaloes, respectively. Seroprevalence of BHV-1 was 45.45% in animals without clinical signs and 24.46% in animals with history of different clinical conditions.

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