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Serological investigation of infectious bovine rhinotracheitis in Bovines in Gujarat state of India

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Abstract

Bovine alphaherpesvirus 1 (BoHV-1) is the major causative agent of abortion and infertility in bovine herd, results in significant financial losses to the dairy industry. Present study was conducted to determine the seroprevalence of infectious bovine rhinotracheitis (BoHV-1) in bovine population from Gujarat, India. The study was conducted from September 2016 to March 2017. A total of 452 serum samples from 6 intensive dairy farms of 3 districts were analysed through Indirect ELISA test to determine the presence of antibodies against BoHV-1. The overall seroprevalence was found to be 30.08%, where the species-wise seroprevalence was found to be higher in buffaloes (56.63%) than in cattle (21.23%) and sex-wise seroprevalence was found to be higher in females (32.63%) than in males (27.31%). In conclusion, the result of present study revealed that the BoHV-1 infection is highly prevalent in bovine population in Gujarat, India. As a result, it is crucial to periodically screen semen dose or bull for prevention and control of BoHV-1 prevalence in Gujarat, India.

Keywords: Bovines, BoHV-1, IBR, indirect ELISA, seroprevalence

1. Introduction

Bovine herpesvirus-1 (BoHV-1) is associated with various clinical syndromes such as infectious rhinotracheitis, pustular vulvovaginitis and balanoposthitis, abortion, infertility, conjunctivitis and encephalitis in cattle (Barrett *et al.*, 2018) [1]. Infectious bovine rhinotracheitis (IBR) is a multi-organ infectious and contagious disease of domestic ruminants which brings about significant financial losses into the dairy industry worldwide (Kipyego *et al.*, 2020) [7].

BoHV-1 is a member of the genus *Varicellovirus* in the subfamily *Alphaherpesvirinae*, which belongs to the *Herpesviridae* family (Nandi *et al.*, 2009) [12]. The viral nucleocapsid has 162 capsomeres arranged in an icosahedral symmetry. It is of 150-200 nm in size and contains a double-stranded DNA genome of approximately 140 kbp (Kapil & Basaraba, 1997) [5]. The virus can be transmitted horizontally through contact, natural mating or artificial insemination and aerosol (inhalation) transmission and may also be transmitted vertically across the placenta. Infected animals remain carriers for the remainder of their lives. Morbidity and mortality vary considerably and reported lower in dairy herds than in beef cattle (Farooq *et al.*, 2012) [3].

In India, IBR has been known to exist earlier, 1976 (Mehrotra *et al.*, 1976) [11] since then it has been reported from all states and becoming endemic in India. The biggest financial losses to Indian dairy farmer are caused by BoHV-1-related abortions, which mostly happen in the last trimester of pregnancy (Yadav *et al.*, 2018). In India several seroprevalence studies have been carried out by different researchers and observed 23.94% to 84.5% prevalence of IBR in bovine herds in different states of country (Farooq *et al.*, 2012; Kollannur *et al.*, 2014; Patil *et al.*, 2017; Rahman *et al.*, 2011; Trangadia *et al.*, 2012) [3, 8, 15, 16, 20].

For conventional serology, virus neutralization test (VNT) and the gB ELISA are commonly used serological tests for detection of BoHV-1 antibody in the serum of animals (Mahajan *et al.*, 2013) [9]. Detection of antibody against IBR indicate the animal exposed to BoHV-1. The present study carried out on serological investigation of IBR by indirect ELISA in cattle and buffalo from 3 districts of the Gujarat, India.

2. Materials and Methods

2.1 Study Area and Sample collection: A present study was conducted during September 2016 to March 2017 in six intensive dairy farms of cattle and buffalo located in 3 districts (Anand, Vadodara and Junagadh) of Gujarat, India.

A total of 452 serum samples of male and female were collected which includes 339 cattle and 113 buffalo blood serum samples. The serum samples were collected into sterile vials, labelled, and stored at -20 °C.

2.3 Detection of antibodies against BoHV-1: The serum based IDvet (Innovative Diagnostics, France, Barcode No.-IBRS-5P, Lot No.-B62) Indirect ELISA kit was used as per manufacturers' instructions for the detection of antibodies against BoHV-1. The levels of the antibody titres in animals were designated as +1, +2, +3, +4 and +5 based on the sample to positive percentage (S/P %), calculated using the O.D. of sample and positive and negative control, with (+1) being 60% to 100%, (+2) for 100 to 200%, (+3) for 200 to 300%, (+4) for 300 to 400% and (+5) for 400 to 500%. The result of present study calculated as per manufacturer instructions. The levels of antibody

3. Result and Discussion

High economic losses in organized dairy farms are attributed primarily due to reproductive disorders, caused by various infectious agents like *Brucella* spp., *Leptospira* spp., BoHV-1, *Campylobacter* spp. *Trichomonas* etc (Trangadia *et al.*, 2010) [21]. Hence, in the current study animals in the farms were screened against the sexually transmitted diseases (IBR), so as to determine seroprevalence of BoHV-1. The present serological study revealed 30.08% (136/452) seroprevalence of IBR by Indirect ELISA with many animals showing high titers of antibodies (Table 1). Location-wise seroprevalence, 26.57% (72/271) in Anand, 37.34% (59/158) in Vadodara and 21.74% (5/23) in Junagadh districts. The results of this study confirmed the presence of IBR infection through seroprevalence of BoHV-1 antibodies among dairy cattle and buffalo in Gujarat, India. Similar rate of seroprevalence was reported by Maresca *et al.* (2018) [10], Kipyego *et al.* (2020) [7] and Wedajo *et al.* (2021) [23] i.e. 31.9%, 30.9% and 25.6% in different low and middle income country (LMIC), respectively. When compared to other seroprevalence studies conducted in different regions of India, the obtained results were almost similar to those reported by Mahajan *et al.* (2013) [9], Kollannur *et al.* (2014) [8] and Thakur *et al.* (2017) [19] with seropositivity of 31.2%, 32.25 and 29.03%, respectively. Kathiriya *et al.* (2018) [6] reported a slightly

higher seroprevalence of 35.19% in three districts of Gujarat. Other extensive study done by National Dairy Development Board (NDDB) reported 23.94% (true prevalence, 18.20%) apparent prevalence of IBR in 77 cattle and buffaloes herd in Gujarat (Trangadia *et al.*, 2012) [20].

Present study showed 27.31% (59/216) breeding cattle and buffalo bulls, and 32.63% (77/236) females tested positive for presence of BoHV-1 antibodies (Table 2). Out of the 59 positive bulls, 10.23% (13/127) were cattle bulls, while 51.68% (46/89) were buffalo bulls. The overall seroprevalence in cattle was found to be 21.23% (72/339) and 56.63% in buffaloes (64/). This study showed higher seroprevalence in buffaloes (56.63%) than cattle (21.23%). Out of the females that tested positive, 27.83% (59/212) were cattle and 75% (18/24) were buffaloes. The seroprevalence in females (32.63%) was found to be more than in males (27.31%). Similar to present study a higher seropositivity (25% to 85%) in buffaloes as compared to cattle in organised farms of India was reported by Nandi *et al.* (2011) [13]. Thakur *et al.* (2017) [19]; Vipul *et al.* (2015) [22] and Nezzal *et al.* (2017) [14] also recorded higher seroprevalence rates of BoHV-1 antibodies of 25.00% to 40.80% in buffaloes as compared to 17.44% to 32.92% in cattle. The results of this study vary from another reported study in India, showing higher seroprevalence of IBR in cows as 40.8%, whereas a lower rate (7.84%) was seen in buffaloes (Mahajan *et al.*, 2013) [9].

In organised farm higher seropositivity of 38.6% in cattle bulls than in buffalo bulls (13.5%) was reported in different regions of India (Nandi *et al.*, 2011; Samrath *et al.*, 2016) [13, 17]. Seroprevalence studies conducted in breeding bulls in Gujarat, India showed seropositivity of 36.13% and 33.99% in cattle and buffalo bulls, respectively (Jain *et al.*, 2009; Kathiriya *et al.*, 2018) [6]. Similar to present study result sex wise higher seropositivity in females (19.02% to 67.92) than males (16.22% to 33.33) were recorded in other studies conducted in various part of India (Saravanajayam *et al.*, 2018; Thakur *et al.*, 2017; Vipul *et al.*, 2015) [18, 19, 22]. The possible reason for higher seropositivity in females might be due to the use of unscreened infected semen/seropositive bull for insemination/breeding (Dora *et al.*, 2013; Trangadia *et al.*, 2010) [2, 21].

Table 1: Location wise details of serum samples positive for BoHV-1 antibodies with titer.

Sr. No.	Location	Farm Name	Cattle					Buffalo					Total
			Titre					Titre					
			+1	+2	+3	+4	+5	+1	+2	+3	+4	+5	
1.	Anand	Farm A, Anand	4	2	1	2	4	35	1	6	4	0	59
2.		Farm B, Anand	2	1	1	4	1	--	--	--	--	--	9
3.		Farm C, Anand	0	1	0	3	0	--	--	--	--	--	4
4.	Vadodara	Farm D, Vadodara	4	0	5	12	1	0	2	7	4	0	35
5.		Farm E, Vadodara	0	2	2	17	3	--	--	--	--	--	24
6.	Junagadh	Farm F, Junagadh	0	0	1	3	1	--	--	--	--	--	5
Total			10	6	10	41	10	35	3	13	8	0	136

Table 2: Sex-wise seroprevalence of BoHV-1.

Sr. No.	Type of Animal	No. of Animals Tested	Positive	
1	Males	Cattle	127	216
		Buffalo	89	
2	Females	Cattle	212	236
		Buffalo	24	
Total		452	136 (30.08%)	

4. Conclusions

In conclusion, there was evidence of the presence of BoHV-1 in dairy cattle and buffalo herd in Gujarat, India. Therefore, seroprevalence of BoHV-1 should be also determined in other regions of the state of Gujarat, as well as in other states of the country, to have more accurate data on the presence of the disease in India, and to take preventive measures to avoid its dissemination. Based on the observations of the study, it is also advised that purchase of new animals or selection of breeding bulls must be made after proper screening for IBR.

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6. Conflict of Interest statement: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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8. Ethical Statement: Ethical review and approval were not required for this animal study because only blood samples collected from organised farm of cattle and buffalos.

9. References

- Barrett D, Parr M, Fagan J, Johnson A, Tratalos J, Lively F, *et al.* Prevalence of bovine viral diarrhoea virus (BVDV), bovine herpes virus 1 (BHV 1), leptospirosis and neosporosis, and associated risk factors in 161 Irish beef herds. *BMC veterinary research.* 2018;14(1):1-10. doi:<https://doi.org/10.1186/s12917-017-1324-9>
- Dora RS, Concepcion AA, Felipe MP, Zeferino GV, Anabel CR, Mariel AD. Seroprevalence and risk factors associated with infectious bovine rhinotracheitis in unvaccinated cattle in southern Veracruz, Mexico. *African journal of microbiology research.* 2013;7(17):1716-1722. doi:10.5897/AJMR12.1334
- Farooq S, Kumar A, Chaudhary S, Patil C, Banger Y, Khasa V. *et al.* Sero-prevalence and risk factor analysis of BoHV-1 in bovines in Haryana state of India. *Indian Journal of Animal Research.* 2012;55(5):582-587. doi:10.18805/ijar.B-4001.
- Jain L, Kanani A, Kumar V, Joshi C, Purohit J. Detection of bovine herpesvirus 1 infection in breeding bulls by ELISA and PCR assay. *Indian Journal of Veterinary Research.* 2009;18(1):1-4.
- Kapil S, Basaraba RJ. Infectious bovine rhinotracheitis, parainfluenza-3, and respiratory coronavirus. *Veterinary Clinics of North America: Food Animal Practice.* 1997;13(3):455-469. doi:[https://doi.org/10.1016/S0749-0720\(15\)30308-X](https://doi.org/10.1016/S0749-0720(15)30308-X)
- Kathiriya J, Sindhi S, Mathapati B, Bhedi K. Seroprevalence of infectious bovine rhinotracheitis (bvh-1) in dairy animals with reproductive disorders in saurashtra of Gujarat, India. *International Journal of Current Microbiology and Applied Sciences.* 2018;7(3):1371-1376. doi:10.20546/ijcmas.2018.703.164
- Kipyego ES, Gitau G, Vanleeuwen J, Kimeli P, Abuom TO, Gakuya D *et al.* Sero-prevalence and risk factors of infectious bovine rhinotracheitis virus (type 1) in Meru County, Kenya. *Preventive veterinary medicine.* 2020;175:104863. doi: <https://doi.org/10.1016/j.prevetmed.2019.104863>
- Kollannur JD, Syam R, Chauhan R. Epidemiological studies on infectious bovine rhinotracheitis (IBR) in different parts of India. *Int. J Livest. Res.* 2014;4(5):21-27. doi:10.5455/ijlr.20140717052204
- Mahajan V, Banga H, Deka D, Filia G, Gupta A. Comparison of diagnostic tests for diagnosis of infectious bovine rhinotracheitis in natural cases of bovine abortion. *Journal of comparative pathology.* 2013;149(4):391-401. doi:10.1016/j.jcpa.2013.05.002
- Maresca C, Scoccia E, Dettori A, Felici A, Guarcini R, Petrini S, *et al.* National surveillance plan for infectious bovine rhinotracheitis (IBR) in autochthonous Italian cattle breeds: Results of first year of activity. *Veterinary microbiology,* 2018;219:150-153. doi: <https://doi.org/10.1016/j.vetmic.2018.04.013>
- Mehrotra M, Rajya B, Kumar S. Infectious bovine rhinotracheitis (IBR)-keratoconjunctivitis in calves. *Indian Journal of Veterinary Pathology.* 1976;1:70-73.
- Nandi S, Kumar M, Manohar M, Chauhan R. Bovine herpes virus infections in cattle. *Animal Health Research Reviews.* 2009;10(1):85-98. doi:10.1017/S1466252309990028
- Nandi S, Kumar M, Yadav V, Chander V. Serological Evidences of Bovine Herpesvirus-1 Infection in Bovines of Organized Farms in India. *Transboundary and emerging diseases.* 2011;58(2):105-109. doi: <https://doi.org/10.1111/j.1865-1682.2010.01185.x>
- Nezzal S, Hassan I, Ali R. Serosurveillance and molecular detection of bovine herpesvirus-1 (bvh-1) in cattle and buffaloes in Baghdad. *Advance Animal and Veterinary Science.* 2017;5:283-288. doi:10.17582/journal.aavs/2017/ 5.7.283.288
- Patil S, Prajapati A, Krishnamoorthy P, Desai G, Reddy G, Suresh K, *et al.* Seroprevalence of infectious bovine rhinotracheitis in organized dairy farms of India. *Indian Journal of Animal Research.* 2017;51(1):151-154. doi:10.18805/ijar.7084
- Rahman H, Hemadri DJH. Vision 2030-project directorate on animal disease monitoring and surveillance, ICAR Hebbal, Bengaluru. In: Karnataka, 2011.
- Samrath D, Shakya S, Rawat N, Gilhare VR, Singh F. Isolation and adaptation of bovine herpes virus Type 1 in embryonated chicken eggs and in Madin-Darby bovine kidney cell line. *Veterinary world.* 2006;9(2):222. doi:10.14202/vetworld.2016.222-225
- Saravanajayam M, Kumanan K, Balasubramaniam A. Evaluation of three immunological assays in detection of bovine herpes virus-1 (BoHV-1) antibodies in buffaloes. *Buffalo Bulletin.* 2018;37(3):297-301.
- Thakur V, Kumar M, Rathish R. Seroprevalence of bovine herpesvirus-1 antibodies in bovines in five districts of Uttarakhand. *Veterinary world.* 2017;10(2):140. doi:10.14202/vetworld.2017.140-143
- Trangadia B, Rana S, Nagmani K, Srinivasan V. Serological investigation of bovine brucellosis, Johne's disease and infectious bovine rhinotracheitis in two states of India. *Journal of Advanced Veterinary Research* 2012;2(1):38-41.
- Trangadia B, Rana SK, Mukherjee FASV. Prevalence of brucellosis and infectious bovine rhinotracheitis in

- organized dairy farms in India. *Tropical Animal Health and Production*. 2010;42(2):203-207.
doi:<https://doi.org/10.1007/s11250-009-9407-7>
22. Vipul T, Mahesh K, Sukdeb N, Rathish R. Detection of bovine herpes virus-1 antibodies in bovines in three districts of Uttarakhand by competitive ELISA. *Haryana Veterinarian*. 2015;54(2):168-170. Retrieved from <http://www.luvas.edu.in/.../21.pdf>.
23. Wedajo MT, Alemayehu L, Tefera Y, Hagos A, Abadi AR. Seroprevalence of infectious bovine rhinotracheitis and brucellosis and their effect on reproductive performance of dairy cattle. *Journal of Veterinary Medicine and Animal Health*. 2021;13(2):106-113. doi:10.5897/JVMAH2020.0889
24. Yadav V, Singh SP, Kumar R, Diwakar R, Kumar P. A Review on Current Status of Infectious Bovine Rhinotracheitis in India. *International Journal of Current Microbiology and Applied Sciences*. 2018;7:411-426.