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Research Article

SEROPREVALENCE OF BLUETONGUE IN SHEEP GOATS AND CATTLE OF MEGHALAYA

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The study was undertaken to assess the presence of bluetongue (BT) infection, if any, among the cattle, sheep and goats of Meghalaya. Meghalaya is a North-eastern state of India, where BT incidence/outbreak has not been reported in animals so far. Serum samples were collected from apparently healthy sheep, goats and cattle from different districts (n=7) of Meghalaya. Anti-BT antibodies were detected in sera using indirect enzyme linked immunosorbent assay (iELISA). Out of total 702 samples (sheep-147, goats-188 and cattle-367) collected and tested, 43 from sheep (29.3%), 114 from goats (60.6%) and 168 from cattle (45.8%) were found to possess anti-BT antibodies. The present paper reports sero-prevalence status of bluetongue in Meghalaya, for the first time, which may indicates the presence of circulating bluetongue virus in the state.

Key words: Antibodies, Bluetongue, iELISA, Meghalaya, Seroprevalence, Virus

Bluetongue (BT) is an economically significant, acute, infectious, vector-borne viral disease of a large range of domestic and wild ruminants. The major hosts of BT are sheep and some wild ruminants (Ruiz-Fons *et al*., 2008). Goats, cattle and some other ruminants show the disease sub-clinically (MacLachlan and Dubovi, 2011). Bluetongue virus (BTV), the type species of the genus *Orbivirus*, under family *Reoviridae* is the causative agent of bluetongue (Attoui *et al*., 2009). The virus

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is transmitted through biting midges (*Culicoides* spp.), in which the virus also replicates. In India, BT was first reported from Maharashtra that caused a heavy economic loss in sheep husbandry (Sapre, 1964). Since then, the southern and western states of India experienced several incidences and/ or outbreaks of BT. Out of 27 serotypes distributed globally, 22 serotypes have been reported from various parts of the country and 13 different serotypes (BTV1-4, 6, 9, 10, 12, 16-18, 21, 23) have been isolated so far (Chand *et al*., 2014). However, the eastern and north-eastern parts of India are considered to be an un-affected region in terms of active disease prevalence (Prasad and Srivastava, 1995 and Joardar *et al*., 2009). Seroprevalence of BT was reported from most parts of Indian subcontinent except some of the north-eastern states including Meghalaya (Rajkhowa *et al*., 2008; Joardar *et al*., 2012; Joardar *et al*., 2013; Joardar *et al*., 2015 and Halder *et al*., 2016).

The present study was undertaken to investigate the seroprevalence of BT among the sheep, goat and cattle population of Meghalaya.

MATERIALS AND METHODS

Sera: Fresh serum samples that were collected randomly from apparently healthy sheep (n= 147), goats (n= 188) and cattle (n=367) from different agro-climatic zones of Meghalaya state covering various districts, *viz*., East Khasi hills, West Khasi hills, South-West Khasi hills, West Jaintia hills, Ri-Bhoi, East Garo hills and West Garo hills (Fig. 1 and Table 1). Samples were collected from adult animals (more than one year in the case of cattle and more than 3 months in the case of sheep and goat) of both sexes. Collected sera were stored at -20ºC till further use.

Enzyme linked immunosorbent Assay: For detection of anti-bluetongue antibodies in test serum samples, i-ELISA was performed using BTV antigen supplied from the collaborating center of All India Network Programme on Bluetongue (AINP-BT) at IVRI, Mukteswar following the standard protocol (De *et al*., 2008). The reading was taken in an ELISA plate reader (ECIL) at 492 nm and average optical density (O.D.) values for the negative and positive controls was calculated. The frequencies of positive and negative O.D. values were plotted in frequency distribution curve and the intersection point (0.278) of two curves were considered as negative cut off O.D. value.

RESULTS

In the present study, altogether, 46.3% serum samples were recorded as positive for BTV group specific antibodies in sheep, goats and cattle of Meghalaya, of which 43 (29.3%), 114 (60.6 %) and 168 (45.8%) were from sheep, goats and cattle respectively (Table 1).

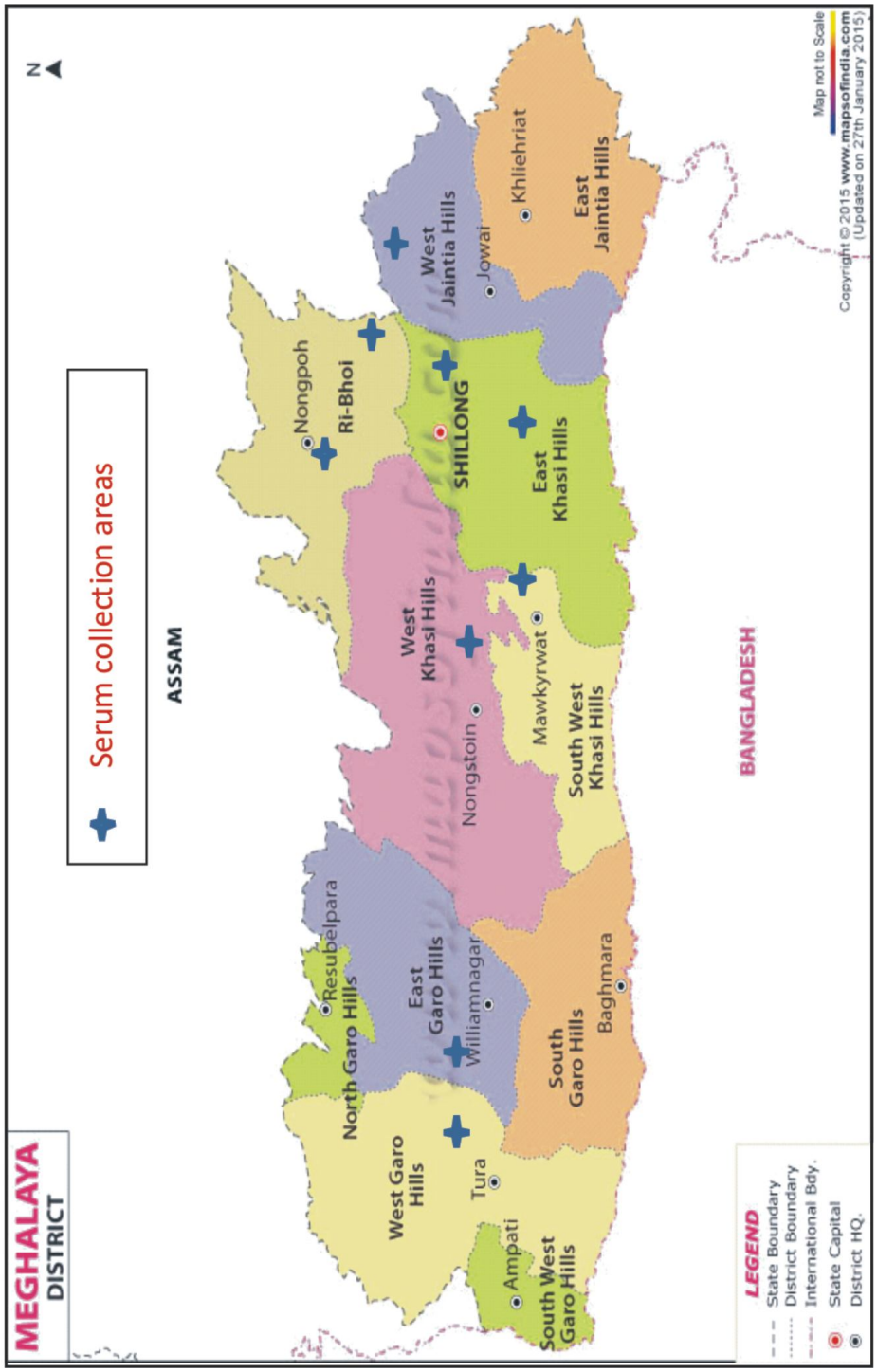

Fig. 1. Serum sample collection areas of different districts of Meghalaya

Table 1. Details of collected samples covering different agro-climatic zones

Sl. No	Agro-climatic zones	District	Collection area	Number of serum samples collected
1	Humid with moderately warm summer and severe cold winter featuring high rainfall (2800-6000 mm)	Part of East Khasi Hills	Mawngap-Rim, Mawmyrsiang, Rangskhen	431
2	Humid & moderately cold in winter with high rainfall (2800-4000 mm)	West Khasi Hills & East Garo Hills	Mawthadraishan, Mawkohngei, Nongshillong, Bolkinggre, Ampangdanggre	121
3	Warm & humid with medium rainfall (1270-2032 mm)	Ri-bhoi, West Jaintia Hills, Part of East Khasi Hills & West Garo Hills	Patharkhmah, Kyrdemkulai, Sonidan, Saitsama, Laitkseh, Mawkynthih, Rongram, Asanang	140
4	Humid & hot with high rainfall (2800-4000 mm)	South West Khasi Hills	Nonglang, Mawlangwir	10
		Total		**702**

Table 2. Assessment of anti-bluetongue antibodies in serum samples of ruminants by i-ELISA

Species	Serum samples collected	Number of positive samples
Sheep	147	43 (29.30%)
Goat	188	114 (60.60%)
Cattle	367	168 (45.80%)
Total	**702**	**325 (46.30%)**

DISCUSSION

The overall seroprevalence of the assessed serum samples under the present study are in accordance with the other workers from India (Sreenivasulu and Subba Rao, 1999; De *et al*., 2008; Tigga *et al*., 2015; Joardar *et al*., 2016; Chauhan *et al.*, 2004 and Panda *et al*., 2011).

In case of sheep, earlier Naresh and Prasad (1995) reported 23.5% seroprevalence in Haryana, Himachal Pradesh, and Punjab, which is nearly similar to the present study. In addition, Chauhan *et al.* (2004) also reported 36.11% seropositivity for BTV in sheep from Gujarat.

In goat, the high seroprevalence (60.6%) was observed in the present study that corroborates with the previous findings (Panda *et al.*, 2011). However, comparatively lower percent positivity (31%) was reported earlier by Joardar *et al*. (2013, 2014). Tigga *et al.* (2015) recorded 43.33% sero-positivity in BT in Jharkhand state.

In cattle, the seropositivity detected (45.8%) corroborates with the observations of Panda *et al*. (2011) and Joardar *et al.* (2016), who reported 52.00% seropositivity in West Bengal and 42.37% in Tripura, respectively. However, Dayakar *et al.* (2001) reported higher seropositivity in Andhra Pradesh (65.91%), Karnataka (79.15%) and Tamil Nadu (80.95%). High prevalence of anti-bluetongue antibodies (70.00%) was reported in cattle serum samples of Assam (Joardar *et al*., 2013). However, much lower sero-positivity was recorded in West Bengal (16.21%) (Chakrabarti *et al.*, 2007) and in northern Kerala (6.9%) (Arun *et al*., 2013). The seroprevalence of BT in sheep, goats and cattle in different states of India has shown wide variation, as they represented different agro-climatic zones, covering the sub-temperate south, semi-arid north and north west, humid and sub-humid east and sub-temperate Himalayan region (Dubey *et al.*, 1987; Govindarajan *et al*., 2002 and Singh *et al*., 2009) and different methods of investigation (Shringi and Shiringi, 2005 and Prasad *et al*., 1992). The difference in seroprevalence might be associated with the season of study and breed of animals studied.

In conclusion, this study shows the seroprevalence of BT in sheep, goats and cattle in Meghalaya, although active disease incidence/ outbreak has not been reported so far. Further studies should be conducted to identify the vector midges from various districts of Meghalaya and also to identify existing BTV serotypes circulating in the state.

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REFERENCES

Arun S, John K, Ravishankar C, Mini M and Ravindran R *et al*., 2013. Seroprevalence of bluetongue among domestic ruminants in northern Kerala, India. Trop Biomed, 31: 26-30

Attoui H, Maan SS, Anthony SJ and Mertens PPC, 2009. In: Bluetongue virus, other orbiviruses and other reoviruses: Their relationships and taxonomy, 1st ed., London, Elsevier/Academic Press, pp 23

Chakrabarti A, Lodh C, Joardar SN and Aich R, 2007. Seroprevalence of bluetongue in West Bengal-current status. Indian J Comp Microbiol Immunol Infect Dis, 28: 63-64

Chand K, Biswas SK, Pandey AB, Muthuchelvan D and Mondal B, 2014. Bluetongue in India: A review. Adv Anim Vet Sci, 3(11): 605-612

Chauhan HC, Chandel BS, Vasava KA, Patel AR and Singh NM *et al*., 2004. Seroprevalence of blue-tongue in Gujarat. Indian J Comp Microbiol Immunol Infect Dis, 25: 80-83

Dayakar S, Sreenivasulu D, Sudharani K, SubbaRao MV and Sreenivasulu P, 2001 Serological survey for the prevalence of bluetongue virus antibodies in cattle by competitive enzyme linked immunosorbent assay. Indian J Anim Sci, 71(7): 614-616

De A, Batabyal S, Biswas SK, Chand K and Singh RK, 2008. Surveillance of bluetongue virus antibody in goats using a recombinant VP7-based indirect ELISA in the coastal saline area of West Bengal, India. Vet Ital, 45: 339-346

Dubey SC, Mohan Rao TR, Srivastava CP, Lonkar PS and Maru A, 1987. Seroprevalence of bluetongue disease in Rajasthan. Indian J Anim Sci, 58: 66-68

Govindarajan R, Venadabady N, Prabhakar TG, Albert A and Koteeswaran A, 2002. Seroprevalence of bluetongue in Tamil Nadu. Cherion, 31: 99-100

Halder A, Joardar SN, Isore DP, Samanta I and Parui P, 2016. Seroepidemiology of bluetongue in South Bengal. Vet World, 9(1): 1-5

Hubschle OJB, Lorenz RJ and Matheka HD, 1981. Enzyme linked immunosorbent assay for detection of BTV antibodies. Am J Vet Res, 42: 61-65

Joardar SN, Lodh C, Chakrabarti A, Baksi S and Aich R, 2009. Isolation of bluetongue virus serotypes 15 and 21 in West Bengal, India. Vet Rec, 165: 751-752

Joardar SN, Singh NI, Barkataki B, Lodh L and Chakraborti A, 2012. Seroprevalence of bluetongue in ruminants of Manipur. Indian J comp Micrbiol Immunol Infect Dis, 33: 54-56

Joardar SN, Barkataki B, Halder A, Lodh C and Sarma D, 2013. Seroprevalence of bluetongue in north eastern Indian state-Assam. Vet World, 6(4): 196-199

Joardar SN, Halder A, Maity A, Mishra SK and Lodh C, 2014. Seroprevalence of bluetongue in ruminants of Orissa. Indian J Comp Microbiol Immunol Infect Dis, 35(2): 1-3

Joardar SN, Mukherjee S, Lodh C, Halder A and Mukherjee A, 2015. Seroprevalence of bluetongue in free range mithuns (*Bos frontalis*). Adv Anim Vet Sci, 3(9): 500-502

Joardar SN, Halder A, Lodh C, Mahanti A and Barui A, 2016. Seroprevalence of bluetongue in ruminants of Tripura. Indian J Anim Hlth, 55(2): 161-166

Maclachlan NJ and Dubovi EJ, 2011. Fenner's Veterinary Virology. Academic Press, London, pp 283

Naresh A and Prasad G, 1995. Relative superiority of c-ELISA for detection of bluetongue virus antibodies. Indian J Exp Biol, 33(11): 880-882

Panda MK, Mondal A and Joardar SN, 2011. Seroprevalence of bluetongue virus in sheep, goat, and cattle in West Bengal, India. Animal Sci Rep, 5(3): 105-110

Prasad G, Jain NC and Gupta Y, 1992. Bluetongue virus infection in India: a review. Rev Sci Tech Off Int Epiz, 11: 699-711

Prasad G and Srivastava RN, 1995. Epizootiology of bluetongue virus in particular reference to India. In Bluetongue: Indian Perspective. Eds. Prasad, G. and Srivastava, R.N., CCS HAU Press, Hisar, CCS Haryana Agricultural University, pp 1-3

Rajkhowa S, Rajkhowa C, Dutta PR, Michuui P and Das R, 2008. Bluetongue infection rate in Mithun (*Bos frontalis*) in the north-eastern upland region of India. Rev Sci Tech Off Int Epiz, 27: 907-914

Ruiz-Fons F, Reyes-Garcia AR, Alcaide V and Gortazar C, 2008. Spatial and temporal evolution of bluetongue virus in wild ruminants, Spain. Emerg Infect Dis, 14: 951-953

Sapre SN, 1964. An outbreak of bluetongue in goats and sheep. Indian Vet Rev, 15: 78-80

Shringi S and Shiringi BN, 2005. Comparative efficacy of AGID, CCIE and competitive ELISA for detecting bluetongue virus antibodies in indigenous breed of sheep and goats in Rajasthan. Indian J Vet Sci, 6: 77-79

Singh A, Agrawal R, Singh R, Singh RK and Pande N, 2009. Indirect-ELISA based on recombinant Vp7 specific protein for sero-epidemiological investigation of bluetongue in small ruminants of Jammu province. J Immunol Immunopathol, 11(2): 52-55

Sreenivasulu D and Subba Rao MV, 1999. Seroepidemiology of bluetongue disease in Andhra Pradesh. Indian J Anim Sci, 69: 292-294

Tigga P, Joardar SN, Halder A, Lodh C and Samanta I *et al*., 2015. Seroprevalence of bluetongue in ruminants of Jharkhand. Vet World, 8(3): 346-349

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