



SHORT COMMUNICATION

Seroprevalence of Bluetongue among Sheep Population of Odisha

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ABSTRACT

Serum analysis was performed during October 2015 to April 2016 to ascertain the prevalence of bluetongue (BT) virus infection among sheep population in Odisha. Samples were collected randomly from apparently healthy sheep from 10 different agro-climatic zones of Odisha. Serum samples were screened for BT virus (BTV) antibodies using indirect enzyme linked immunosorbent assay (i-ELISA) at Division of Virology, IVRI, Mukteswar. Out of 217 samples screened, 60.36% samples were found positive for BTV infection. The prevalence of BTV antibodies in different agro-climatic zones ranged from 38.09% to 100%. This seroprevalence picture of BT, first of its kind, unfolds this viral infection among sheep population in Odisha.

Keywords: Seroprevalence, bluetongue, i-ELISA, sheep, Odisha

Bluetongue (BT), an important viral disease categorized by OIE in list A arthropod-borne haemorrhagic viral disease, is comparatively difficult to differentiate at the field level from other endemic viral diseases due to overlapping clinical signs. The disease usually affects both domestic and wild ruminants of semi-tropical and temperate regions. But it is mostly considered as a disease of sheep causing remarkable economic losses in the form of morbidity and mortality. The endemicity of BT has been reported in 11 states of India (Prasad, 2000). The present seroprevalence study was undertaken to unveil the real status of BT among sheep population in all agro-climatic zones of Odisha, India.

Serum samples from 217 sheep were collected randomly between October-2015 and April-2016 covering all 10 agro-climatic zones of Odisha. Concerned nomadic shepherds and field veterinarians were simultaneously interrogated to collect information suggestive of BT in their flock or locality, if any. Samples were subjected to serological assay for detection of antibodies against BT virus (BTV) using indirect ELISA based on VP7 protein using the test protocol as per De *et al.* (2008). Reading

was taken at 492 nm and the average optical density (OD) values of negative control was calculated and compared with the test OD values. The OD values of tests that were higher than the average OD values of the negative control were considered as positive for BTV antibodies. The results were subjected to Chi-square test using SPSS software (Indian version) to determine the difference in susceptibility with $p \leq 0.05$.

Among 217 serum samples analyzed, 60.36% samples were positive for presence of BTV antibodies with 54.25% (51/94) in males and 65.04% (80/123) in females. The seroprevalence of BT in sheep with respect to sex was non-significant ($p > 0.05$). Of the total serum samples processed, the highest prevalence of 100% was found in South Eastern Ghat and the lowest of 38.09% in Western Central Table L and (Table-1). Earlier observation among sheep in coastal and central regions of Odisha between October 2011 and March 2012 indicated an overall prevalence of 52.43% (Pany *et al.*, 2016). Odisha having diverse agro-climatic zones falls on tropics (17°49'-22°36'N latitudes and 81°36' - 87°18' E longitudes) and are likely to be endemic to BTV. As there is statistically

Table 1: Seroprevalence of Bluetongue in different agro-climatic zones of Odisha

Sl. No.	Agro-climatic zones	Number of Serum samples tested	Number of serum samples positive for BTV antibodies (%)
I	North Western Plateau	16	43.75
II	North Central Plateau	15	93.33
III	North Eastern Coastal Plain	29	48.71
IV	East & South Eastern Coastal Plain	54	53.70
V	North Eastern Ghat	11	54.54
VI	Eastern Ghat High Land	19	73.68
VII	South Eastern Ghat	19	100.0
VIII	Western Undulating Zone	17	82.35
IX	Western Central Table Land	21	38.09
X	Mid Central Table Land	16	68.75
	Total	217	60.36

significant ($P < 0.05$) difference in seroprevalence, it could be corroborated to the variable herd immunity and other predisposing environmental factors affecting the label of virulence of BTV.

Seropositivity among non-descript adult sheep of Delhi was reported to be 13.21% (Audarya *et al.*, 2015). Arun *et al.* (2014) demonstrated an overall prevalence of 7.5% among sheep of Kozhikode district and 16% among sheep of Palakkad district of Northern Kerala. Seropositivity of 58.82% among sheep and 31.79% among goats was reported by Joardar *et al.* (2013) in Assam. Bitew *et al.* (2013) detected antibodies against BTV in 28.6% sheep and goats of Uttar Pradesh.

So far 26 distinct serotypes of BTV have been recognised with no cross protectivity, against which, 21 serotypes are prevalent in India (Maan *et al.*, 2011). Virus concentrations in secretions and excretions of infected animals are minimal, making direct, indirect, or aerosol transmission unlikely. *Culicoides* biting midges are the only significant natural transmitters of the virus. Movement of the vectors play an important role in transmission of the disease. Of the 1400 species prevalent world-wide, 39 species of *Culicoides* have been reported in India (Sreenivasulu *et al.*, 2004). The ambient temperature, air humidity and total seasonal rainfall influence the ability of biting midges to carry and transmit BTV. A minimum temperature of 15°C favours replication BTV in *Culicoides* (Mellor *et al.*, 2000) and the intensity of replication rises with increasing temperature (Van Dijk and Huisman, 1982). Meteorological data indicate that Odisha has diverse

climatic zones with low to high rainfall which in turn facilitate breeding and availability of *Culicoides*. All the above factors attributed towards variation of the seropositivity of BT in different agro-climatic zones of the state.

It is quite impossible to eliminate *Culicoides* midges completely in the natural environment. Control of vectors by insecticides or protection from vectors may lower the number of insect bites and thereby the risk of exposure to BTV infection. Prophylactic immunization remains the most effective and practical control measure against BT in endemic regions. However, no commercial vaccine is available in India now. Use of vaccines with different serotypes does not provide consistent cross-protection. Further, use of live-attenuated vaccines involves some amount of risk as the insects may transmit the vaccine virus(es) from vaccinated to non-vaccinated animals and result in re-assortment of genetic material and give rise to new viral strains. Systematic and extensive epidemiological studies coupled with immunization of susceptible stock using the vaccine produced by local strains could be focused for the control of the disease at regional level.

SUMMARY

A total of 217 serum samples from apparently healthy sheep of all the 10 different agro-climatic zones of Odisha were screened for bluetongue virus (BTV) antibodies by indirect ELISA at Division of Virology, IVRI, Mukteswar

during October 2015 to April 2016. Prevalence of BTV antibodies in different agro-climatic zones ranged from 38.09% to 100% with an overall rate of 60.36%.

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