Vol 16 No 1, p 89-92

AN OVERVIEW OF BLUE TONGUE IN CAMELS

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ABSTRACT

A variable rate of seroprevalence of Blue tongue virus in camels has been reported from various parts of the world. Serotype specific antibodies have also been detected. However, there is no clinical disease reported in camels. Therefore, the nature of the Blue tongue infection in the camels along with its role in the maintenance of infection should be unfolded through further pathogenicity and carrier state studies.

Key words: Bluetongue virus, camels, seroprevalence

Bluetongue Virus (BTV) is the causative agent of bluetongue, a non-contagious, insect transmitted disease of domestic and wild ruminants (Spruell, 1905; Hourrigan and Klingsporn, 1975). The disease is widely endemic and has been reported from most of the tropical and subtropical regions of the world (Hawkes, 1996).

Bluetongue principally affects sheep and some wild ruminant species in which it may cause a severe systemic disorder with moderate to high mortality. Though cattle, buffaloes, goats, camels and certain wild animals are also susceptible to BTV infection, the clinical form of disease is not frequently encountered. However, these ruminants provide a niche for maintenance as carriers of virus. The infected bovines exhibit prolonged viraemia compared to sheep and may act as reservoir hosts for BT virus (Gard and Melville, 1992).

Bluetongue virus (BTV) is a prototype virus of orbivirus of the family Reoviridae (Pringle, 1999). It is composed of 10 discrete segments of ds-RNA genome surrounded by 2 layers of protein capsid. Viral structural proteins *viz,* VP3 and VP7 have been associated with group specific antigens of the virus and have been utilised for production of group specific diagnostic reagents (Naresh *et al,* 1996). Due to the presence of segmented RNA genome, the virus is prone to frequent mutations. This has led to emergence of genomically diverse serotypes/strains of the virus. Till to date, 24 serotypes of the virus have been recognised and many more may be prevalent in the regions, where detailed antigenic studies have not been carried out so far (Malik *et al,* 2000).

BT was first described in South Africa, where it has probably been endemic in wild ruminants. The first confirmed outbreak outside the Africa was reported in 1943 in Cyprus. Perusal of literature revealed reports pertaining to the existence of virus in Africa, Australia, North America, Central America and Caribbean Basin, South America, Europe and Asia.

In the Indian subcontinent, the disease was first reported from Pakistan in 1959 (Sarwar, 1962). Subsequently, the first outbreak of bluetongue in India was recorded in 1963 (Sapre, 1964) among sheep and goats in Maharashtra State. Since then, wide spread prevalence has been reported from the various parts of the country (Prasad *et al,* 1992; Sreenivasulu *et al,* 1995).

Natural cycle of BTV infection involves a complex interaction between the insect vector, ruminant host and the environment. The usual biological vectors of BTV are certain species of biting midges of the genus *Culicoides*. BTV infection occurs in most of the tropical, semitropical and temperate regions of the world in parallel with the distribution of its vector.

Bluetongue, though recognised more than a century ago, continues to be an economically very important disease affecting susceptible domestic and wild ruminants throughout the world. The regions which are considered endemic areas of bluetongue virus (BTV) are inhabited by two thirds of sheep and cattle population around the globe between 40°N and 35°S (Ozawa, 1985; Shimshony *et al,* 1988).

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The resultant economic losses due to bluetongue infection are attributed to high morbidity, abortions, stillbirths, foetal abnormalities, milk, meat and fleece losses. In addition, the presence of BTV in a country puts a trade barrier on movement of ruminants, their germplasm, embryos and other animal by-products thereby disturbing international livestock business. BTV is listed under category ''A'' of the Office Internationale des Epizootis (OIE) and consequently restrictions are imposed on movement of ruminants from bluetongue endemic regions to bluetongue free zones and so are of major importance to international trade (Alexander *et al,* 1996).

Serological surveys in countries where BT exists showed the presence of BT virus group specific antibodies in the sera of various ruminant species. In camels with the exception of the camel pox, a very little information is available regarding the viral diseases of camels. However, sero-epidemiological studies have confirmed that the camel produces antibodies to a great number of pathogenic viruses without developing disease (Wernery, 1995; Wernery and Kaaden, 2002).

BTV has the wide host range and there is a paucity of information on the prevalence of BTV infection in camels, many workers have carried out the studies on BTV in camels. Understanding of prevalence of BTV in domestic camels and their potential role as reservoir of BTV is important. Moreover, camels are reared along with sheep or cattle, there are chances of exchanging or sharing certain diseases.

Review of literature showing occurrence of BTV infection in Inida and other countries

Afshar and Kayvanfar (1974) reported the presence of BTV precipitating antibodies in 5.90% in serum samples of camel in Iran.

Simpson (1979) demonstrated that BTV precipitating antibodies in sera of cattle, camels, sheep, goats and seven game species. The seroprevalence rate was 92% in cattle, 83% in goats, 81% in camels, and 36% in sheep in Botswena.

Barzilai (1982) examined 56 sera samples collected from camels and the prevalence rate was 23.12% in Israel.

Abu Elzein (1984) detected the BTV antibodies in apparently healthy animals in Sudan. The overall prevalence rate was 75% in 40 cattle, 80% in 73 sheep and 14.60% in 89 dromedaries. Abu Elzein (1985) detected BTV antigen in 5.60% of 89 Sudanese camels by AGID test.

Hafez *et al (*1984) reported the presence of BTV antibodies in sheep, goats, cattle and camels. Sera were collected from 6 localities of U.A.E. The results indicated the presence of BTV antibodies in 336 sheep (60%), 26 goats (43%), 20 cattle (18%) and 2 camels (67%). This was the first report on the occurrence of BT in Saudi Arabia.

Abu Elzein (1985) conducted a serological survey of the one humped camel (*Camelus dromedarius*) in the Sudan, employing the microagar gel immunodiffusion test. The rate of seroprevalence was 16.6%.

Stanley (1990) reported the seroprevalence of BT in camels in Yemen. The prevalence rate was 13%.

Abu Elzein *et al* (1998) conducted serological survey for antibodies to BTV, Akabana virus, Orf virus and PPRV in AL-Rub AL Khali desert in sheep, goats and camels. The rate of prevalence for BTV antibodies was 83% in sheep and goats, while camel sera showed 58% prevalence.

Since the first report in 1963 in India (Sapre, 1964), serosurveys have indicated the presence of BTV antibodies in the sera of sheep, goats, cattle, buffaloes, camels and wild animals.

Chandel and Kher (1999) reported seroprevalence of bluetongue in dromedary camels in Gujarat, India. Out of 150 sera tested 14 (9.33%) were positive. Seroprevalence was 12.69% in Kuchchhi breed, and 6.9% in Marwari breed of camels.

Chandel *et al* (2001) reported the detection of precipitating antibodies to BTV in aborted and clinically healthy ruminants in north Gujarat in cattle, buffaloes, sheep, goats and camels by AGID test. The over all seroprevalence was 18.06 per cent. The seropositive reactions in aborted cattle, buffaloes and goats were 18.75%, 29.63% and 36.84%, respectively.

Mallik *et al* (2002) carried out a serological survey of BT in camels in Rajasthan India. A total of 182 sera of Bikaneri and Jaisalmeri camels were tested and 18 (9.89%) were found positive.

Chandel *et al* (2003) compared the performance of standard AGID test and c-ELISA for the detection of serum antibodies against BTV in clinically healthy and diseased camels in Gujarat state. Out of 176 sera tested, 22(12.5%) and 34 (19.3%) were positive for group specific antibodies by AGID and c-ELISA, respectively.

Chauhan *et al* (2004) carried out sero-epidemiological study of BTV in dromedary camels in Gujarat, India. Out of 326 sera samples of camels screened for the presence of BTV group specific

antibodies, the overall rate of seroprevalence was 26.69 and 38.84% by BT-AGID and c-ELISA, respectively. BTV serotype specific neutralizing antibodies against BTV serotype 1, 2, 3, 4, 10, 12, 14, 15, 16, 17, 18, 20, 21 and 24 were detected.

Patel *et al* (2007) screened 82 camel sera for the presence of BTV group specific antibodies. The over all rate of seroprevalence was 25.61, 28.05 and 37.80% by BT-AGID, CCIE and c-ELISA, respectively.

Chauhan *et al* (2007) studied the seroprevalence of BTV in camels as well attempts were also made to isolate and to detect BTV dsRNA genome from the blood samples of camels showing stiffness and positive for trypanosomes. Out of 205 serum samples screened for the presence of BTV group specific antibodies, 62 (30.24%) of the samples were found positive. However, none of the sample was found positive for the virus or BTV genome by RNA-PAGE and RT-PCR.

Discussion

Perusal of published reports did not reveal any information on the clinical manifestation of BT in camels. But, it was construed that BTV has been the cause of a disease in camels in tropical Africa called, *da-chonou*, which was manifested by loss of appetite, abortion, necrotic gingivitis and conjunctivitis (Guindo, 1975). However, there was serological evidence of anti-bluetongue virus antibodies in apparently healthy as well as in diseased camels. The results obtained by Chandel *et al* (2003) and Chauhan *et al* (2004) showed higher rates above 50% in camels showing stiffness and trypanosomosis. These findings are interesting and need further investigation. Stiffness, resulting in lameness has been reported in cattle by BTV (Osburn *et al,* 1983). The higher seroprevalence in camels positive for trypanosomosis may be associated with transmission of BTV by blood sucking flies, which requires further epidemiological study in camels. Interestingly, 11 camels aborted (irrespective of the stage of gestation period) were also tested for BTV antibodies and out of 11, 6 (54.54%) were positive by c-ELISA (Chauhan *et al,* 2004). A higher rate of positive reactors to BTV in aborted camels was closely similar to aborted sheep, goats, cattle and buffaloes (Toangonkar *et al,* 1983; Prasad *et al,* 1987; Chandel *et al,* 2001).

Conclusion

As camels are reared along with sheep or cattle in certain areas there are chances of exposure to certain diseases and prevalence of BTV antibodies in camels appears to be related to BTV infection in sheep and cattle. Therefore, the nature of the BT infection in the camels along with its role in the maintenance of infection should be unfolded through further pathogenicity and carrier state studies.

References

Abu Elzein EME (1984). Rapid detection of bluetongue virus antigen in the sera and plasma of camels, sheep and cattle in the Sudan, using the Gel Immunodiffusion Test. Archives of Virology 79:131-134.

Abu Elzein EME (1985). Bluetongue in camels: a serological survey of the one humped camel (*Camelus dromedarius*) in Sudan. Revue d'élevage et de Médecine Vétérinaire des Pays Tropicaux 38:438-442.

Abu Elzein EME, Sandouka MA, Al-Afalea AI, Mohamed OB and Flamand JRB (1998). Arbovirus infections of ruminants in Al-Rub Al-Khali desert. Veterinary Record 142:196-197.

Afshar A and Kayvanfar H (1974).Occurrence of precipitating antibodies to Bluetongue virus in sera of farm animals in Iran. Veterinary Record 94:233-235.

Alexander GI, Alexander MP and St.George (1996). Bluetongue – its impact on international trade in meat and livestock. Bluetongue disease in Southeast Asia and the Pacific. ACIAR Proceeding No. 66. pp 254. (Eds.) St. George, T.D. and Peng Kegao.

Barzilai E (1982). Bluetongue antibodies in camels' sera in Israel. Refuah Veterinarian 39:90-93.

Chandel BS and Kher HN (1999a). Seroprevalence of bluetongue in dromedary camels in Gujarat. Journal of Camel Practice and Research 6:83-85.

Chandel BS, Chauhan HC and Kher HN (2003). Comparison of the standard AGID test and competitive ELISA for detecting Bluetongue virus antibodies in camels in Gujarat, India. Tropical Animal Health and Production 35:99-104.

Chandel BS, Chauhan HC, Kher HN and Shah NM (2001). Detection of precipitating antibodies to Bluetongue virus in aborted and clinically healthy ruminants in North Gujarat. Indian Journal of Animal Science 71:25-26.

Chauhan H C, Chandel BS, Gerdes T, Vasava KA, Patel A R, Kher HN, and Dongre RA (2004). Seroepidemiology of Bluetongue in Camels in Gujarat. Journal of Camel Practice and Research 11:141-145

Chauhan HC, Chandel BS, Kher HN, Bhalodia SD, Shah NM and Bulbule NR (2007). Seroprevalence of Bluetongue in Dromedary Camels in Gujarat. Proceedings International Camel Conference, February 16-17, 2007 at College Veterinary and Animal Science, Rajasthan Agricultural University, Bikaner. pp 11.

Gard GP and Melville LE (1992). In, Bluetongue, African Horse Sickness and Related Orbiviruses. Eds. T.E. Walton and B.I. Osburn, C.R.C. Press. Boca Raton, USA. pp 85-92.

Guindo O (1975). Blue tongue serological survey of domestic and wild ruminants in tropical Africa. These Ecole Nationale Veterinaire d Lyon.

Hafez SM, Radwan AI, Bekairi SI and AL-Mukayel AA (1984). Serological evidence for occurrence and prevalence of bluetongue among ruminants in Saudi Arabia. Arab Gulf. Journal of Science and Research 2:289-295.

Hawkes RA (1996). The global distribution of Bluetongue. Bluetongue disease in Southeast Asia and the Pacific. ACIAR Proceedings No. 66. pp 6-14. (Eds.) St. George, T.D. and Peng Kegao.

Hourrigan JL and Klingsporn AL (1975). Epizootiology of blue tongue; the situation in the United States of America. Australian Veterinary Journal 51:203-208.

Mallik T, Minakshi, Dahiya S, Ramesh K, Pawan K and Prasad G (2002). Bluetongue virus antibodies in domestic camels (*Camelus dromedarius*) in Northern regions of Rajasthan, India. Indian Journal of Animal Science 72:551-552.

Mallik Y, Maan S, Minakshi and Prasad G (2000). Genomic diversity of the Bluetongue virus and its implication in disease control. Livestock International 8:4-11.

Naresh A, Roy P and Prasad G (1996). Evaluation of recombinant Bluetongue virus antigens, using dot immunobinding assay with serum from sheep and cattle. American Journal of Veterinary Research 57:1556-1558.

Osburn BI, Stott JL and Howard M (1983). A review of Bluetongue. Programme in California: Studies in sheep. Proceedings of Animal Health Association 87:527-532.

Ozawa Y (1985). Bluetongue and related arboviruses: Overview of the world situation. Prog. Clin. Biol. Res. 178:13-20.

Patel AR, Chauhan HC, Chnadel BS, Kher HN, Dadawala AI, Agrawal S M and Patel Smital (2007). Seroprevalence of Bluetongue in camels in organised farms in Gujarat. Journal of Camel Practice and Research 14:97-100.

Prasad G, Jain NC and Gupta Y (1992). Bluetongue virus infection in India. Revue scientifique et technique / Office International des épizooties, International Office of Epiz 11:699-711.

Prasad G, Jain NC, Mahajan NK and Vasudevan B (1987). Prevalence of blue tongue precipitating antibodies in different domestic animals. Indian Journal of Animal Science 57:522-524.

Pringle CR (1999). Virus taxonomy. Archives of Virology 144:421-429.

Sapre SN (1964). An outbreak of Bluetongue in goats and sheep in Maharashtra State in India. Veterinary Review 15:69-71.

Sarwar MM (1962). A note on Bluetongue in sheep in West Pakistan. Pakistan Journal of Animal Science 1:1-2.

Simpson VR (1979). Bluetongue antibody in Botswana's domestic and game animals. Tropical Animal Health and Production 11:43-49.

Shimshony A, Barziali E, Savir D and Davidson M (1988). Epidemiology and control of Bluetongue disease in Israel. Revue scientifique et technique / Office International des épizooties, International Office of Epiz 7:311-329.

Spreull J (1905). Malarial Catarrhal Fever (Bluetongue) of Sheep in South Africa. Journal of Comparative Pathology 18:321-337.

Sreenivasulu D, Subba Rao MV and Gard GP (1995). Bluetongue viruses in India: A Review: Bluetongue disease in Southeast Asia and the Pacific. ACIAR Proceedings. No. 66. pp 15-18. (Eds.) St. George, T.D. and Peng Kegao.

Stanley MJ (1990). Prevalence of bluetongue precipitating antibodies in domesticated animals in Yemen Arab Republic. Tropical Animal Health and Production 22:163-164.

Tongaonkar SS, Ayangar SK, Singh BK and Kant R (1983). Seroprevalence of bluetongue virus in Indian buffalo (*Bubalus bubalis*). Veterinary Record 112:326.

Wernery U (1995). Viral infections in camels: A review. Journal of Camel Practice and Research 6:1-12.

Wernery U and Kaaden OR (2002). Infectious Diseases in Camelids. Blackwell Wissenschafts-Verlag, Berlin. pp 109-115.