SHORT COMMUNICATION

Sokoto Journal of Veterinary Sciences
(P-ISSN 1595-093X/ E-ISSN 2315-6201)
Peter *et al*/*Sokoto Journal of Veterinary Sciences* (2015) 13(3): 49-52
http://dx.doi.org/10.4314/sokjvs.v13i3.8

Detection of bovine viral diarrhea virus antibodies in camels (*Camelus dromedarius*) in Maiduguri, Nigeria

ID Peter[1], AD El-Yuguda[2], GD Mshelia[1] & JS Dawurung[3]

1. *Department of Veterinary Surgery and Theriogenology, Faculty of Veterinary Medicine, University of Maiduguri, Nigeria*
2. *Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, University Maiduguri, Nigeria*
3. *WHO National Polio Laboratory, University of Maiduguri Teaching Hospital, Maiduguri, Nigeria*

*Correspondence: Tel.: + 2348030640189, E-mail: idamudu@gmail.com

Abstract
This study was carried out to determine the seroprevalence of bovine viral diarrhea virus (BVDV) antibodies in camels presented for slaughter at the Maiduguri abattoir using a BVDV specific indirect enzyme-linked-immunosorbent assay (ELISA). Ninety (90) serum samples collected from adult male and female camels were tested for BVDV antibodies. From the samples tested, 28 (31.1%) were positive for BVDV. The sex distribution of the positive samples showed 7 (33.3%) males and 21 (30.4%) females were positive for BVDV antibodies. The results showed no statistically significant ($p<0.05$) difference in the sex prevalence of camels observed in the study. This finding demonstrates the presence of BVDV antibodies in camels in Maiduguri. Further studies will be required to elucidate the epidemiology of BVDV infection in camels and other livestock species in the study area.

Keywords: Antibodies, Bovine viral diarrhea virus, Camels, Nigeria, Seroprevalence
Received: 15-04- 2015 Accepted: 03-08-2015

Introduction

The growing human population in the world has brought into focus the issue of food security amongst others; thus the need to explore alternatives to meat, milk and other products (Ahmad *et al.,* 2010). Camels have been domesticated for meat, milk and transport over 4, 000 years ago (Muhammad & Akpan, 2008; Bamaiyi & Kalu, 2011; Gadahi *et al.,* 2013). The Nigerian camel population was reported to be slightly over 87, 000 heads which are found mostly in the northern parts of the country (Bamaiyi & Kalu, 2011). Although considered a less conventional source of meat compared to cattle, sheep and goats (Kurtu, 2004), it can be a better option for animal protein compared to cattle as it has a large body mass and good dressing percentage (Mukasa-Mugerwa, 1981). Camels are adversely affected by lack of water, poor feed, heat stress and diseases (Bamaiyi & Kalu, 2011; Mshelia *et al.,* 2013) leading to decrease in productivity. Studies have shown that camels are susceptible to common diseases affecting other animal species such as brucellosis and bluetongue (Yousif *et al.,* 2003; Amstel & Kennedy, 2010; Wernery, 2012; Gadahi *et al.,* 2013).

Bovine viral diarrhea virus (BVDV), a member of the genus Pestivirus is characterized by a wide spectrum of clinical manifestations from mild infections to severe clinical signs resulting in respiratory, reproductive or immunosuppressive diseases (Duong *et al.,* 2008; Kampa *et al.,* 2009). The virus is maintained in animal population by persistently infected animals that become infected *in-utero* prior to development of immunocompetence and thus shed BVDV for life (Passler *et al.,* 2009). Bovine viral diarrhea virus infection is not exclusively a disease of cattle, but affects sheep (Paton *et al.,* 1995), rabbits (Frolich & Streich, 1998), camels (Belknap *et al*., 2000) and goats (Passler *et al*., 2014). It has been reported that BVDV can produce cases of diarrhoea, ill thrift, reproductive loses as well as respiratory disease in camelids (Kapil *et al*., 2009). The virus has recently been described as an emerging disease in camelids (Wernery, 2012) but the distribution globally is yet to be determined. A

recent report (Mshelia *et al*., 2014) from this study area has shown that camels are commonly found grazing together with cattle and other ruminant species in Nigeria, which could lead to cross infections with BVDV amongst these species. In view of the above, this study was designed to determine the seroprevalence of BVDV antibodies in camels slaughtered at the Maiduguri abattoir in Nigeria.

Materials and methods

Study area

The study was carried out in Maiduguri, Nigeria which lies between longitude $10^0$48`N and latitude $11^0$20`E. The city is cosmopolitan and is situated at 354 m above sea level. The months of March and April are usually the hottest months, while November to January are the cold dry periods. The city receives annual rainfall from June to September (Mayomi & Mohammed, 2014)

Animals and sample collection

Slaughter animals brought into Maiduguri from locations within northern Borno state and even trade animals from neighbouring Niger and Chad Republics were used for this study. Adult animals (<4 years) were selected for sampling. Their ages were estimated according to the methods described by Bello *et al*. (2012).

Between June and August, 2013, blood samples from ninety (90) dromedary camels were collected at the point of slaughter and transferred into plain vacutainer tubes. The samples were then placed on ice pack and transported to the Animal Virus Research Laboratory, Department of Veterinary Microbiology and Parasitology, University of Maiduguri, Nigeria where serum was separated by centrifuging at 3 000 x g (4000 rpm) for 15 minutes and stored in identifiable vials at -20^0C until tested.

Serological test

Sera were tested for antibodies specific for BVDV using an indirect Enzyme Linked Immunosorbent Assay (ELISA) Kit (Bio-X Diagnostics, Belgium). The test was performed according to the instruction of the manufacturer. Both positive and negative control sera were included in the assay. The results were read by a microplate reader (Emax precision Micro plate reader, California, USA), where the optical density (OD) of the positive and negative sera and those of all the samples were measured at 450 nm wavelength. The cut-off point for positive and negative tests were OD values < 2.216 and >3.391 respectively.

Data analysis

Data generated from the study were expressed as simple percentages and presented in a table. The Fischer's Exact test was used to compare prevalences between male and female animals. P-value was considered significant at 0.05.

Results and Discussion

The result shows that BVDV antibodies were detected in 28 (31.1%) of the 90 camel serum samples tested. The sex distribution of the positive samples showed 7 (25%) males and 21 (75%) females (Table 1), but there was no statistically significant (P>0.05) difference in detection rates between male and female camels tested. The rate of detection of BVDV antibodies in camels in the present study is higher than the 1.3% previously reported by Baba *et al*. (1996) who used agar gel immunodiffusion technique in the same study area. This sharp rise may be due to increased spread of infection amongst this species or due to differences in the assay techniques used. The antibodies detected in this study may likely be due to natural exposure of camel to BVDV as vaccination of animals against bovine viral diarrhea virus is not practiced in Nigeria. Besides Baba *et al*. (1996), there seems to be no other reports available on the sero-prevalence of BVDV in camels in Nigeria to the best of our knowledge. The sero-prevalence pattern observed in the present study can be compared to the findings obtained elsewhere. For example, seroprevalence rates ranging from 1.6 to 23% have been reported in Oman (Hedger *et al.,* 1980), USA (Doyle &

Table 1: Prevalence of BVDV antibodies in camels in Maiduguri, Nigeria

Sex	Number of Samples tested	Detection Rates	
		Positive n (%)	Negative n (%)
Male	21	7 (33.3)	14 (66.7)
Female	69	21 (30.4)	48 (60.6)
Total	90	28 (31.1)	62 (68.9)

Heuschele, 1983), Sudan (Bornstein & Musa, 1987), Saudi Arabia (Al-Afaleq *et al.,* 2006) and the UAE (Wernery *et al.,* 2008); higher sero-prevalence rates (>52%) have also been reported among camels in Egypt (Zaghana, 1998) and Sudan (Intisar *et al.,* 2010). The prevalence of BVDV in camels observed in the present study could arise as a result of cross infection from other animal species as they are found grazing together freely in rangelands in the northern frontiers of Nigeria (Mshelia *et al*., 2014). To validate this claim, a study should be focused on the detection and molecular characterization of BVDV from camelids and other animals to compare their genotypes and to determine their phylogeny.

In conclusion, this study has revealed a prevalence of BVDV (31.1%) antibodies among camels presented for slaughter at the Maiduguri abattoir. Since there is no vaccination against the virus in this region, the present finding indicates that camels might be exposed to natural BVDV infection, thus the epidemiology of this virus in camel population needs to be elucidated. A larger sample size will be required to determine the true seroprevalence in this animal species. Furthermore, studies should also be carried out to isolate and genetically characterize the field strains of BVDV in other animals and to determine the disease burden caused by this virus in Nigeria.

Acknowledgement

The authors acknowledge the technical assistance of the staff of Animal Virus Research Laboratory, Department of Veterinary Microbiology and Parasitology, University of Maiduguri, Nigeria. The assistance of the management and personnel of the Maiduguri Municipal abattoir during sample collection is highly acknowledged.

References

Ahmad S, Yaqoob M, Hashmi N, Ahmad S, Zaman MA & Tariq M (2010). Economic importance of camel: A unique alternative under crisis. *Pakistan Veterinary Journal,* **30** (2):191-197

Al-Afaleq A, Abu-Elzeim EME & Hegazy AA (2006). Sero surveillance for antibodies against some viral diseases of livestock in camels (*Camelus dromedarius*) In Saudi Arabia. *Proceedings of the International Scientific Conference on Camels*, (ISSC`06), Qasim University, Kingdom of Saudi Arabia, Pp 338-346.

Amstel SV & Kennedy M (2010). Bovine viral diarrhea infections in new world camelids - A Review. *Small Ruminant Research,* **91**(2-3): 121-126.

Baba SS, Tekki S & Akoma M (1996). Preliminary Survey for antibodies against selected viral causes of diarrhea in slaughtered camels (*Camelus dromedarius*) in Borno state, Nigeria. *West African Journal of Biology*, **4**(1): 56-62.

Duong MC, Alenius S, Huong LTT & Bjorkman C (2008). Prevalence of *Neospora caninum* and bovine viral diarrhea virus in dairy cows in southern Vietnam. *The Veterinary Journal*, **175**(3): 390-394.

Frolich K & Streich WJ (1998) Serologic evidence of bovine viral diarrhea virus in free living

Bamaiyi PH & Kalu AU (2011). Gastrointestinal parasites infections in one humped camels (*Camelus dromedarius*) of Nigeria. *Veterinary Research Forum*, **2**(4): 278-281.

Bello A, Sonfada ML, Umar AA, Umaru MA, Shehu SA, Hena SA, Onu JE & Fatima OO (2013). Age estimation of camel in Nigeria using rostral dentition. *Scientific Journal of Animal Science*, **2**(1): 9-14.

Belknap EB, Collins JK, Larsen RS & Conrad KP (2000). Bovine viral diarrhea virus in New World Camelids. *Journal of Veterinary Diagnostic Investigation,* **12**(6): 568-570.

Bornstein S & Musa BE (1987). Prevalence of antibodies to some viral pathogens, *Brucella abortus* and *Toxoplasma gondii* in serum from camels (*Camelus dromedarius*) in Sudan. *Journal of Veterinary Medicine Series B*, **34**(1-10): 364-370.

Doyle LG & Heuschele WP (1983). Bovine viral diarrhea virus infection in captive exotic ruminants. *Journal of American Veterinary Medical Association*, **183**(11): 1257-1259. rabbits from Germany. *Journal of Wildlife Diseases,* **34** (1): 173-178.

Gadahi JA, Bhutto B, Kashif J, Shoaib M, Ehsan M, Javaid SB & Salman M (2013). Tick infestation in camels in Thar desert of Sindh-*Pakistan International Journal of Livestock Research*, **3**(1): 114-118.

Hedger RS, Barnett TR & Gray DF (1980). Some virus disease of domestic animals in the Sultanate of Oman. *Tropical Animal Health and Production*, **12**(2): 107-114.

Intisar S, Ali YH, Khalafalla AI, Mahasin EA & Amin AS (2010). The first report on the prevalence of pestivirus infection in camel in Sudan. *Tropical Animal Health and Production,* **42**(6):1203-1207.

Kampa J, Alenius S, Emanuelson U, Chanlun A & Aiumlamai S (2009). Bovine herpes virus type 1 (BHV-1 and bovine viral diarrhea virus (BVDV) Infection in dairy beef herds: self clearance and the detection of seroconversions against a new atypical pestivirus. *The Veterinary Journal,* **182**(2): 223-230.

Kapil S, Yeary T & Everman JF (2009). Viral disease of new world camelids. *Veterinary Clinics of North America*: *Food Animal Practice,* **25**(2): 323-337.

Kurtu MY (2004). An assessment of the productivity for meat and the carcass yield of camels (*Camelus dromedarius*) and of the consumption of camel meat in the eastern region of Ethiopia. *Tropical Animal Health Production*, **36**(1): 65-76.

Mayomi I & Mohammed JA (2014). A decade assessment of Maiduguri urban expansion (2002-2012): Geospatial approach. *Global Journal of Human-Social Science: B Geography, Geo Sciences, Environmental Disaster Management*, https://globaljournals.org/GJHSS_Volume 14/1-A-Decade-Assessments-of-Maiduguri-Urban.pdf, retrieved 14-08-2015.

Mshelia GD, Abba Y, Voltaire YAC, Akpojie G, Mohammed H & Aondona, DU (2013). Comparative uterine bacteriology and pathology of camels (*Camels dromedarius*) and cows in north-eastern Nigeria. *Comparative Clinical Pathology,* **22**(6): 1195-1200.

Mshelia GD, Okpaje G, Voltaire YAC & Egwu GO (2014). Comparative studies on genital infections and antimicrobial susceptibility patterns of isolates from camels (*camelus dromedarius*) and cows (*bos indicus*) in Maiduguri, north eastern Nigeria. *SpringerPlus,* doi:10.1186/2193-1801-3-91.

Muhammad BF & Akpan IN (2008). Camel (*Camelus dromedarius*) Meat utilization in Kano-Nigeria (ii): Post slaughter handling and marketing wholesale meat cuts. *Research Journal of Animal Sciences*, **2**(4): 113-117.

Mukasa-Mugerwa E (1981). The Camel (*Camelus dromedarius*): A Bibliographic Review, International Livestock Center for Africa. ILCA Monograph. Addis Ababa, Ethiopia. Pp 67.

Passler T, Riddell K P, Edmondson M A, Chamorro MF, Neill JD, Brodersen BW, Walz H L, Galik PK, Zhang Y & Walz PH (2014). Experimental infection of pregnant goat with bovine viral diarrhea virus (BVDV) 1 or 2. *Veterinary Research*, **4**:45:38.

Passler T, Walz PH, Ditchkoff SS, Brock KV, DeYoung RW, Foley AM & Givens MD (2009). Co habitation of pregnant white-tailed deer and cattle persistently infected with bovine viral diarrhea virus results in persistently infected fawns. *Veterinary Microbiology*, **134**(3-4): 362-367.

Paton DJ, Carlsson U, Lowings JP, Sands JJ, Vilcek S & Alenius S (1995). Identification of herd specific bovine viral diarrhea virus isolates from infected cattle and sheep. *Veterinary Microbiol*ogy, **43**(4): 283-94.

Wernery U (2012). Bovine Viral Diarrhea- An Emerging Disease in Camelids A Review. *American Journal of Virology*, **1**(1): 9-17.

Wernery U, Thomas R, Raghavan R, Syriac G & Joseph S (2008). Sero-epidemiological studies for the detection of antibodies against infectious diseases in dairy dromedaries of the United Arab Emirates using modern laboratory techniques- part II. *Journal of Camel Practice and Research*, **15**(1): 139-145.

Yousif AA, Braun LJ, Saber MS, Aboelleil T & Chase CCL (2003). Cytopathic genotype 2 bovine viral diarrhea virus in dromedary camels. *Arab Journal of Biotechnology*, **7**(1):123-140.

Zaghana A (1998). Prevalence of antibodies to bovine viral diarrhea virus and or border disease virus in domestic ruminants. *Journal of Veterinary Medicine Series B*, **45**(6):345-351.