Sudan J. Vet. Res. (2013), **28***:*47-49 *sudanjvr.net*
With 3 tables in the text.

Short Communication:

Detection of African Horse Sickness Neutralizing Antibodies in Equidae and Some Other Animal Species in Khartoum State, Sudan

Elghazali, F.[1] and Ali, B. H.[2]
(1) Veterinary Research Institute, Soba, P. O. Box 8067 (Alamarat), Khartoum, Sudan.
(2) Department of Microbiology, Faculty of Veterinary Medicine and Animal Production, Sudan University for Science and Technology, P.O. Box 204, Khartoum North, Sudan.

ملخص البحث

أجريت هذه الدراسة لتحديد معدلات أضداد الأنماط المصلية النوعية لفيروس مرض طاعون الخيل (النجمة) فى أمصال الخيول وبعض أنواع الحيوانات الأخرى في ولاية الخرطوم بالسودان. لقد تم الكشف عن تلك الأضداد في الخيول والحمير والأبقار والماعز وغزال دوركاس. لقد تم الكشف عن الأضداد المصلية لانواع فيروس مرض طاعون الخيل ما عدا النمط 8 لأنه لم يكن متوفرا خلال هذه الدراسة. وجود الأضداد المصلية النوعية لهذا الفيروس في الماعز والأبقار وغزال دوركاس قد يشير إلى إحتمال أن تكون هذه الحيوانات بمثابة مضيف حامل للفيروس. الكشف عن ضد مصلي لهذا الفيروس في غزال دوركاس هو الأول من نوعه فى السودان، وبالتالي، هناك حاجة إلى مزيد من الدراسات لتوضيح هذه النتيجة.

Summary

This study was performed to determine the prevalence of type specific neutralizing antibodies to African horse sickness virus (AHSV) in equidae and some other animal species in Khartoum State, Sudan. Antibodies (Abs) to AHSV were detected in horses, donkeys, goats, cattle and Dorcas gazelle (Order: ***Artiodactyla*****). Antibodies to all AHSV serotypes were detected except AHSV-8 because its antigen was not available during this study. The detection of antibodies to AHSV in goats, cattle and Dorcas gazelle points out to the possibility that, these animals might have been exposed to a subclinical infection. The detection of Abs to AHSV in Dorcas gazelle was the first to be reported in the Sudan; consequently, further studies are required to clarify this finding.**

African horse sickness (AHS) is a peracute, acute subacute, or mild disease of *equidae* (Erasmus, 1973) caused by a dsRNA *orbivirus* that belongs to the family reoviridae (Melnick, 1995), transmitted by *Culicoides* (Du Toit, 1944) and has a seasonal incidence (Howell, 1963). Nine antigenically distinct serotypes of AHSV (AHSV-1 through AHSV-9) have been identified according to the amino acid sequence of the structural protein VP2 neutralising epitopes (Burrage *et al*, 1993; Vreede and Huismans, 1994; Martinez-Torrecuadrada and Casal, 1995).

In The Sudan, the disease was firstly clinically described in 1903 (Anon, 1903) and the first virological confirmation as AHSV-3 was made in 1957 (Anon, 1957). This was followed by isolation and identification of AHSV-9 (Eisa, 1974; Hajer *et al*, 1980; Ali, 1981).

The objective of this investigation was to determine the prevalence of neutralizing Abs to AHSV in equidae and some other animal species in Khartoum State using serum neutralization (SN) test.

Sera were collected during November 1996 - April 1997 from different native domestic animals and wild captive animals in Khartoum State. The sera of wild captive animals were collected from the Mogran Zoo Garden. All sampled animals were apparently healthy and had not been vaccinated against AHS. The numbers of sera collected from different animal species are shown in Table 1.

Table 1: Serum samples collected from different animal species of different age groups

Animal species	Age group	No. of Sera
Horses	1-25 years	95
Donkeys (*Equus asinus africanus*)	5-11 years	30
Goats	2-8 years	20
Cattle	4-9 years	20
Greater kudu (*Tragelaphus strepciceros*)	Adult	1
Roan (*Hippotragus equinus*)	Adult	1
Dorcas gazelle (*Gazella dorcas*)	Adult	9
Lion (*Panthera leo*)	10 months	3
Vervet monkeys (*Cercopithecus aethiopius*)	Adult	10
Patas monkeys (*Erythrocebus patas*)	Adult	10
Total		**199**

The collected sera were first screened by agar gel immunodiffusion (AGID) to detect the group specific Abs then positive sera were subjected to SN test to identify the type-specific Abs. Three months post-vaccination sera from horses vaccinated with polyvalent live attenuated Onderstepoort AHS vaccine was used as a control precipitating antisera. Group specific cell associated precipitating antigen was produced as described by Hazrati *et al* (1968) and Hazrati and Dayhim (1971), using neurotropic vaccinal strain of AHSV-1 propagated in VERO cells.

The AGID test was performed as described by Hazrati *et al* (1968). The neurotropic AHSV vaccine strains were used as representatives of AHSV-1 through AHSV-7 and AHSV-9 (AHSV-8 was not available) for SN test. The SN test was performed as described by Hazrati and Ozawa (1965) and House *et al* (1990) in 96-well microtitre plates, and the 50% end-point titres of the sera were calculated by the spearman-karber method (Finney, 1952).

Precipitating Abs to AHSV were detected only in horses, donkeys, goats, cattle and Dorcas gazelle, in a rate of 78.9%, 76.7%, 20%, 15% and 11.1%, respectively. The neutralizing Abs titres to the eight tested AHSV serotypes are expressed in Table 2, and their prevalence in different animal species is expressed in Table 3.

Table 2: Arithmetical mean of AHSV neutralizing antibody titres in different animal species

Animal species	Serotype (-Log10 titre)							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**
Horses	1.97	1.48	2.28	1.86	1.60	1.25	1.67	2.59
Donkeys	1.57	1.47	2.16	1.84	1.74	1.45	1.79	2.66
Goats	1.70	-	1.65	-	1.75	1.40	1.50	1.97
Cattle	-	-	1.70	-	1.20	-	1.10	2.15
Dorcas gazelle	-	-	-	-	-	-	-	1.80
Mean	**1.89**	**1.48**	**2.22**	**1.86**	**1.63**	**1.30**	**1.68**	**2.57**

Table 3: Prevalence of AHSV neutralizing Abs in different animal species

Animal species	NT	Serotype															
		1		**2**		**3**		**4**		**5**		**6**		**7**		**9**	
		NP	**%**	**NP**	**%**	**NP**	**%**	**NP**	**%**	**NP**	**%**	**NP**	**%**	**NP**	**%**	**NP**	**%**
Horses	75	42	56	26	35	47	63	38	51	58	77.3	19	25.3	27	36	72	96
Donkeys	23	10	43.5	9	39.1	12	52.2	11	48	15	65.2	6	26.1	9	39.1	21	91.3
Goats	4	1	25	-	-	2	50	-	-	2	50	1	25	1	25	3	75
Cattle	3	-	-	-	-	1	33.3	-	-	1	33.3	-	-	1	33.3	2	67
Dorcas gazelle	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	100
Total	**106**	**53**	**50**	**35**	**33**	**62**	**58.5**	**49**	**46.2**	**76**	**72**	**26**	**25**	**38**	**36**	**99**	**93.4**

NT = Numbers tested; NP = Numbers positive; % = percentage.

The present investigations reveal Abs to all tested AHSV serotypes, and the high titre of neutralizing Abs in some animals may signify exposure to AHSV infection. The highest titre and prevalence of neutralizing Abs to AHSV-9 could indicate that this is the currently predominant serotype in the Sudan.

In the Sudan, AHS is frequently observed in imported race and breeding horses, while the native Sudanese horses are much less susceptible. This is quite logical as AHS is known in the country since 1903 (Anon, 1903). It could be pointed out that infected native horses may act as carriers of the AHSV though they are clinically normal and consequently they affect susceptible horses.

Abs to AHSV had not been reported before in Dorcas gazelle. The detection of Abs to AHSV-9 in one of the nine tested sera of this animal species could point out to its possible role as an AHSV reservoir. Consequently, further field and experimental investigations are recommended to explain this interesting finding.

Acknowledgments

The authors would like to thank Prof. Ibrahim El Amin Hajer, Dept. of Microbiology, Faculty of Science and Technology, Al Neelain University, for providing some of the literature. Thanks are also extended to the Director of the Veterinary Research Institute and the Director General of Animal Resources Research Corporation for permission to publish this article.

References

Ali, B.H. (1981). Unpublished data.

Anon (1903). Annual Report of Sudan Veterinary service, Ministry of Animal Resources and Fisheries, Khartoum, Sudan.

Anon (1957). Records of the Veterinary Research Division, Ministry of Animal Resources and Fisheries, Khartoum, Sudan.

Burrage, T.G.; Trevejo, R.; Stone-Marschat, M. and Laegreid, W.W. (1993). *Virology*, **196**:799–803.

Du Toit, R.M. (1944). *Onderstepoort J. Vet. Sci. Anim. Ind.,* **19**:7-16.

Eisa, M. (1974). *Br. Vet. J.,* **130**:606-610.

Erasmus, B.J. (1973). Proceedings of the 3rd International Conference on Equine Infectious Diseases. Karger, Basle, Switzerland. Pp. 1-11.

Finney, D.J. (1952). Statistical methods in biological assay, 2nd edn. Hafner publishing Co., New York. Pp. 524-530.

Hajer, I.; Mohmoud, A.W.A. and Shadad, E.Y. (1980). *Bull. Anim. Hlth. Prod. Afr*., **28**:294-298.

Hazrati, A. and Dayhim, F. (1971). *Arch. Inst. Razi.,* **23**:33-43.

Harzati, A. and Ozawa, Y. (1965). *Can. J. Comp. Med*., **29**:173-178.

Hazrati, A.; Mastan, B. and Bahrami, S. (1968). *Arch. Inst. Razi.,* **20**:49-66.

House, C.; Mikicicuk, P.E. and Berninger, M.L. (1990). *J. Vet. Diagn. Invest*., **2**:44-50.

Howell, P.G. (1963). Emerging diseases of animals, FAO, Rome, FAO Agricultural Studies, **61**: 71-108.

Martinez-Torrecuadrada, J.L. and Casal, J.I. (1995). *Virology*, **210**:391–399.

Melnick, J.L. (1995). Murray, P.R., Baron, E.J., Pfaller, M.A., Tenover, F.C. and Yolken, R.H. (eds) Manual of Clinical Microbiology, 6th edn. ASM Press, Washington, D.C.

Vreede, F.T. and Huismans, H. (1994). *J. Gen. Virol.*, **75**:3629–3633.