ELSEVIER

Preventive Veterinary Medicine 38 (1999) 289–293

PREVENTIVE VETERINARY MEDICINE

Prevalence of Surra among camels and horses in Jordan

Mahmoud N. Abo-Shehada[a,*], Hani Anshassi[b], Ghazi Mustafa[c], Zuher Amr[d]

[a] *Parasitology Research Laboratory, Faculty of Veterinary Medicine, Jordan University of Science and Technology (JUST), P.O. Box 3030, Irbid, Jordan*

[b] *Department of Veterinary Laboratories, Ministry of Agriculture, Amman, Jordan*

[c] *The Jordanian Society for Animal Protection, Amman, Jordan*

[d] *Department of Applied Biology, JUST, Irbid, Jordan*

Accepted 28 October 1998

Abstract

The prevalence of *Trypanosoma evansi* infection among camels and horses in Jordan was studied using thick blood smears and inoculation techniques with mice and rats. A total of 437 camels and 83 horses from four climatic zones were surveyed. In addition, 40 donkeys, 32 cattle and 35 goats in contact with infected camels and horses were also tested in the same way. Clinical disease was evident in 8.2% of the camels (36 out of 437) and in 9.6% of the horses (8 out of 83). Infection was limited only to the Sweama area on the Dead Sea (within the warm desert-climatic zone), with prevalence of 30.5% and 33.3%, respectively, for camels and horses. Donkeys, cattle and goats examined were all free from *T. evansi*. Clinically affected camels were positive by both, thick blood smear and mouse and rat inoculations. Rat and mouse inoculations revealed (X^2=3.2, df=1, exact p=0.07) greater number of positive cases in horses than those revealed by thick blood smears. *T. evansi*-infected camels and horses showed all the clinical signs known for Surra. In addition, it was observed that 100% of infected camels stared at the sun.

Keywords: Surra; *Trypanosoma evansi*; Camel; Horse; Jordan

1. Introduction

Camel farming in Jordan is restricted to free-range husbandry within the sampled areas (Table 1). The estimated total population of camels in Jordan is 32 155 head (Anon,

* Corresponding author. Tel.: +962-2-295-111, ext. 2107–2109; fax: +962-2-295-123; e-mail: mshehada@just.edu.jo

0167-5877/99/$ – see front matter
PII: S0167-5877(98)00138-X

Table 1
Prevalence of *Trypanosoma evansi* infection among camels, horses and in contact donkeys, cattle and goats from different localities within four climatic zones in Jordan 1993–1994

Areas	Climatic zone [a]	Camels		Horses		Donkeys		Cattle		Goats	
		No. sampled	% positive (95% CI)	No. sampled	% positive (95% CI)	No. sampled	% positive (95% CI)	No. sampled	% positive (95% CI)	No. sampled	% positive (95% CI)
Sweama	warm desert	118	30.5 (22.4—39.7)	24	33.3 (15.6–55.3)	12	00.0 (0.0–26.5)	12	00.0 (0.0–26.5)	12	00.0 (0.0–26.5)
Mafraq	warm steppe	135	00.0 (0.0–2.7)	18	00.0 (0.0–18.5)	10	00.0 (0.0–30.8)	10	00.0 (0.0–30.8)	12	00.0 (0.0–26.5)
Irbid	warm temperate	66	00.0 (0.0–5.4)	30	00.0 (0.0–11.6)	18	00.0 (0.0–18.5)	10	00.0 (0.0–30.8)	11	00.0 (0.0–28.5)
Balqa	warm temperate	16	00.0 (0.0–20.6)	ND	—	ND	—	ND	—	ND	—
Madaba	warm temperate	62	00.0 (0.0–5.8)	11	00.0 (0.0–28.5)	ND	–	ND	—	ND	—
Ma'an	Cool desert	40	00.0 (0.0–8.8)	ND	—	ND	–	ND	—	ND	—
Total		437	08.2 (5.8–11.2)	83	09.6 (4.3–18.1)	40	00.0 (0.0–8.8)	32	00.0 (0.0–10.9)	35	00.0 (0.0—10.0)

[a] Climate according to the climatic zones of Koppen (Anon, 1984).
ND=Not done.

1991). Horses are bred for different purposes, including agriculture activities, transport, racing, showing and breeding with an estimated population of 9441 head (Anon, 1991).

Surra is a serious disease of camels and horses in Africa and Asia; it is caused by *Trypanosoma evansi*, and transmitted by several species of Tabanid flies. In the Middle East, it causes losses due to reduced productivity, mortality and cost of treatment (Luckins, 1988, 1994; Pathak et al., 1993; Radostits et al., 1994). Prevalence of the infection among camels and horses varies greatly between geographical areas; also, clinical signs are different in different localities (Robertson, 1976). Mortality and morbidity risks of three and 30% were reported among camels (Rutter, 1967). There is an urgent need to obtain recent epidemiological information of Surra in all endemic regions (Luckins, 1988).

In the Middle East, the prevalence of Surra among camels, horses and other domestic animals remains largely unknown. The present study reports on the prevalence of *T. evansi* infection among camels and horses in Jordan as well as among donkeys, cattle and goats in contact with infected camels and horses. Also, it compares between the stained blood smear and animal inoculation (mice and rats) in diagnosing the infection in camels and horses.

2. Materials and methods

During the period April 1993, through October 1994, a total of 437 local dromedary camels 4–8 years old and 83 local Arab cross horses 4–15 years old were surveyed for the occurrence of *T. evansi*. Geimsa stained thin, and thick, blood smears and mouse and rat intraperitoneal and subcutaneous inoculations with 1 ml of blood were employed. Both, male and female animals were sampled, though most animals were females (82% of camels and 79% of horses). The examined animals originated from different climatic zones in Jordan (Table 1). The main areas where camels and horses are raised were visited and 10–20% of the herd were sampled systematically (the first one or two animals and then every tenth animal). One animal was sampled for every two neighboring holdings with <5 animals (90% of holdings). On some occasions (8.5%), permission to sample was denied and the next holding was used. Herds and holdings were sampled once during the study period.

Blood samples were collected aseptically from the ear vein for blood films and from the jugular vein in vacuum tubes containing anti-coagulant (EDTA) for animal inoculation. Giemsa-stained blood films were prepared immediately, and BALB/c mice and Spragaley rats were inoculated with 1 ml of blood subcutaneously (SC) and intraperitoneally (IP) within 2–3 h of collection. Four mice and four rats were used per blood sample (half were inoculated subcutaneously, and the other half inoculated intraperitoneally). Inoculated mice and rats were examined for blood parasites using Giemsa-stained thin, and thick, blood films daily (following inoculation) for one month; a single positive rodent was sufficient for considering the source animal to be infected.

All in-contact donkeys (n=40), cattle (n=32) and goats (n=35) living in the same yards as the infected camels and horses for at least one year were sampled and examined in the same way (Table 1), within 1–3 weeks after sampling the positive animal.

The McNemar's test was used to analyze and compare the results obtained by using the stained blood-smear and animal-inoculation techniques on a matched-pair basis for the horse data (α=0.05, two-sided).

3. Results

Trypanosoma evansi was isolated only from camels and horses and that too from the Sweama area (Table 1). The overall prevalence of *T. evansi* among camels and horses was 8.2% (36 out of 437) and 9.6% (8 out of 83), respectively. However, examined donkeys, cattle and goats were trypanosome-free (and also, showed no clinical signs of trypanosomosis).

Clinically affected camels were positive by both, thick blood smear and by mouse and rat inoculations. There were no subclinically infected camels in the examined sample. Rat and mouse inoculations revealed (McNemar X^2=5.0, df=1, p<0.03) greater number of positive cases in horses than by thick blood smears. Out of the eight parasitologically positive horses by mice and rat inoculation, only three were proven positive by thick blood smear and seven out of them showed clinical signs of Surra.

T. evansi-infected camels and horses showed all the clinical signs known for Surra (Radostits et al., 1994). In addition, 100% of infected camels 'stared at the sun'.

4. Discussion

Sweama on the Dead Sea lies at the lowest point on earth (406 m below sea level), is influenced by the Mediterranean bioclimate, and is situated in the warm desert-climate zone (according to the model of Koppen) (Anon, 1984). Tourists visiting the Dead Sea mainly use camels and horses of the area for riding. Tabanid flies were observed in the Jordan Valley and the area surrounding the Dead Sea feeding on camels and equines, where infection rates with *T. evansi* were 30.5 and 33.3% among camels and horses, respectively. Such rates are comparable with those reported by Rutter (1967) and Pathak et al. (1993). These authors reported infection rates of 30 and 31.6%, respectively, among camels in India.

The fact that a small number of in-contact donkeys, cattle and goats were negative for *Trypanosoma* spp. indicates that they have no role in the epidemiology of Surra in Sweama. There was no evidence of their infection clinically or subclinically in spite of the fact that they come from the same stables/yards where the infected horses and camels lived and were housed. Only one horse was found positive parasitologically but did not show any clinical signs and the owner refused treatment. This asymptomatic case may indicate a carrier status for the disease in horses; such carriers might play an important role in the epidemiology of the disease.

T. evansi prevailed among camels and horses in Sweama and typically caused clinical disease exhibiting all the described clinical signs. One of those clinical signs has not been reported before The mice or rat inoculation technique is of value in the diagnosis of Surra in the horse as 62.5% (five out of eight) of positive cases diagnosed using this technique were negative by the thick blood film technique.

Acknowledgements

The authors thank The Society for Protection of Animals in North Africa (SPANA), London, UK, and The Jordanian Society for Animal Protection, Amman, Jordan, for their help and encouragement.

References

Anon, 1991. Annual reports. Ministry of Agriculture, The Hashemite Kingdom of Jordan.

Anon, 1984. National Atlas of Jordan. 1. Climate and Agroclimatology. Jordan National Geographic Center. pp. 135.

Luckins, A.G., 1988. *Trypanosoma evansi* in Asia. Parasitol. Today 4, 137–142.

Luckins, A.G., 1994. Equine trypanosomiasis. Eq. J. Vet. Edu. 6(5), 259–262.

Pathak, K.M.L., Arora, J.K., Kapoor, M., 1993. Camel trypanosomosis in Rajasthan, India. Vet. Parasitol. 49, 319–323.

Radostits, O.M., Blood, D.C., Gay, C.C. (Eds.), 1994. Veterinary Medicine, A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses, eighth edn. Bailliere Tindall. London. p. 1219.

Robertson, A. (Ed.), 1976. Handbook on Animal Diseases in the Tropics, third edn. British Veterinary Association. pp. 196.

Rutter, T.G., 1967. Diseases of camels. 2. Protozoan diseases. Vet. Bulletin 37, 611–618.