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Serological Evidence of Leptospirosis in Camels in Saudi Arabia

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Abstract: Urine samples collected aseptically from the urinary bladders of 36 slaughtered indigenous camels were examined for leptospirosis by dark field microscopy and culture; all samples were negative. On the other hand, out of 90 Saudi camels' tested serologically for leptospirosis using the plate agglutination test, 6 (6.7%) were positive for leptospiral antibodies (*L. autumnalis*). This is the first serological record of camel leptospirosis in Saudi Arabia.

Key words: Leptospirosis, *L. autumnalis*, camels, Saudi Arabia, antibodies, serovar

INTRODUCTION

The genus *Leptospira* contains numerous, morphologically similar but serologically and genetically distinct serovars belonging to 2 main species: *Leptospira interrogans*, comprising all pathogenic strains and *L. biflexa* comprising all non-pathogenic (saprophytic) strains. More than 250 serovars of *L. interrogans* are known, which are placed into 23 serogroups based on agglutinating antigens and into multiple genomospecies based on DNA studies (Anon, 2003; Dutta and Christopher, 2005).

No information is available on leptospiral infection in Saudi Arabian camels. However, serological evidence of camel leptospirosis has been reported in Egypt, Somalia, Ethiopia, Tunisia, United Arab Emirates, Iran, India, Afghanistan and the former USSR (Wernery and Kaaden, 1995). The only reference to the isolation of leptospires from camel organs is that of Krepkogorskaya (1956), who isolated *L. kazakhstanica* I and II and *L. vetulina* from these animals. The disease has also been reported in the llama (Tibary *et al*., 2006) and other South American camelidae (Ludena and Vangus, 1982; Hodgin *et al*., 1984; Llorente *et al*., 2002).

The following study, was undertaken to determine the presence of leptospiral antibodies in indigenous Saudi Arabian camels.

MATERIALS AND METHODS

Random urine samples were collected aspectically from the urinary bladders of 36 indigenous Najdi camels (1-2 years old) slaughtered in Riyadh central abattoir and examined for leptospires using dark field microscopy and cultural technique (Anon, 2003). In addition, serum samples were collected from 90 male and female camels of different ages from the abattoir and 3 farms around Riyadh. The samples were tested for leptospirosis by the plate agglutination test, using formalinized antigens (Galton *et al*., 1958; Turner, 1970; Brandao *et al*., 1998). Initially, the sera were screened undiluted against 5 antigen pools incorporating 15 leptospiral antigens. Sera reacting with one or more of these pools were then retested undiluted with individual antigens from the positive pool. Thereafter, the sera were titrated with individual reacting suspensions after preparing 1: 5 dilutions and mixing decreasing volumes of the diluted sera with a constant volume of each antigen. Known positive and negative sera were included in each test.

RESULTS AND DISCUSSION

Six (6.7%) of the serologically tested camels were positive, when their sera were tested undiluted against *L. pyrogens*, *L. autumnalis*, *L. pomona* and *L. sejroe* antigens (Table 1). However, further testing using increasing dilutions of the sera showed that all of these animals were positive to the serogroup *L. autumnalis*; the slight reaction to *L. pyrogens* in some camels has occurred only with undiluted serum and was therefore, disregarded. *L. autumnalis* antibodies were previously reported in camels in Egypt (Maronpot and Barsoum, 1972) and India (Mathur *et al*., 1986). Interestingly, 5 of the present positive camels were adult females from one farm where these animals were kept under semi-intensive conditions for milk production and breeding purposes.

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Table 1: Results of macroscopic agglutination test for leptospirosis in indigenous Saudi camels

		Serum dilutions (Undiluted diluted 1/5)				
Antigen	Camel No.	1	2 (0.04 mL)	3 (0.02 mL)	4 (0.01 mL)	5 (0.005 mL)
L. pyrogens	1	+	-	-	-	-
	2	++	-	-	-	-
	3	+	-	-	-	-
	4	±	-	-	-	-
	5	+	-	-	-	-
	6	±	-	-	-	-
L. autumnalis	1	++++	++++	++++	++++	++++
	2	+++	+++	+++	+++	-
	3	+++	++	++	++	+
	4	++	+++	++	-	-
	5	+++	++	++	++	-
	6	++	+++	+++	+++	-
L. Pomona	1	++++	+	-	-	-
	2	++	-	-	-	-
	3	++	-	-	-	-
	4	+	-	-	-	-
	5	++	-	-	-	-
	6	±	-	-	-	-
L. sejroe	1	+++	+	-	-	-
	2	+	-	-	-	-
	3	++	-	-	-	-
	4	+	-	-	-	-
	5	++	-	-	-	-
	6	±	-	-	-	-

Table 2: Serological prevalence of leptospirosis in Saudi camels

Variables	Males	Females	Total
Farm 1	-	0/7	0/7
Farm 2	0/4	5/30 (16.7%)	5/34 (14.8%)
Farm 3	0/5	0/9	0/14
Abattoir	1/34 (2.95%)	0/1	1/35 (2.95%)
Total	1/43 (2.3%)	5/47 (10.6%)	6/90 (6.7%)

Hence, it was not surprising that they all had antibodies against the same serovar. These camels represented 50% of the adult females and 16.7% of all female camels, young and adult, tested on that farm (n = 30). Four other young male camels from the same farm were negative, giving an overall prevalence of 14.8%. The 6th positive reactor was one of 34 camel calves (~1 year old) slaughtered in Riyadh central abattoir (Table 2).

None of the serologically positive camels presently reported was clinically abnormal at the time of testing, although 1 female (camel No. 1) had a relatively high reactivity, suggesting active infection (Table 1). Information on camel leptospirosis in other countries is limited and with the exception of Krepkogorskaya (1956) who isolated leptospires from camels, all available reports on leptospiral infection in this species were based exclusively on serological evidence. Wilson (1984) suggested that leptospirosis is asymptomatic in camels, as did Wernery and Wernery (1990). However, Rafyi and Maghami (1959) detected *L. icterohemorrhagica* antibodies in a she-camel, which suffered from hematuria and subsequently aborted, while Higgins (1986) suggested that leptospirosis might cause non-specific hematuria in camels. By contrast, leptospirosis is a clinically important disease in the llama and other South American camelids and is considered a major cause of abortion in these animals (Tibary *et al*., 2006). Other clinical manifestations of leptospirosis, reported in llamoids include dyspnoea, icterus, anuria and constipation (Fowler, 1999). The disease in cattle and sheep has also been associated with a wide-spectrum of clinical manifestations including hematuria, anemia, icterus, fever and abortion. On the other hand, due to the paucity of information on leptospiral infection in dromedary camels, it is difficult to speculate on the clinical significance, if any, of the disease in these animals.

However, leptospirosis may become more important in camels with the increasing trend towards intensive dairy camel production in some countries like Saudi Arabia (Tibary *et al*., 2006).

The present findings provide the first serological evidence of leptospirosis in indigenous dromedary camels in Saudi Arabia. Further studies should be made into the prevalence, epizootiology and economic importance of leptospirosis in camels and other livestock in Saudi Arabia.

CONCLUSION

Leptospiral antibodies are detectable in the serum of indigenous camels (*Camelus dromedarius*) in Saudi Arabia, providing evidence to the existence of camel leptospirosis in that country and stressing the need for further studies on the prevalence and epizootiology of this important zoonotic disease in Saudi camels.

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