



Seroprevalence of Leptospiral Infection in Rodents of Dairy Cattle Herds Complexes in Suburb of Mashhad - Iran

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Abstract

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A total of 115 rodents including 66 mole rats (*Nesokia indica*) and 49 house mice (*Mus musculus*) were trapped from 18 commercial dairy cattle herds/farms in Mashhad suburb of Khorassan Razavee province, Iran. The microscopic agglutination test (MAT) with 22 live antigens were used to determine serological responses. The seroprevalence (at a titer ≥ 100) was 21.73%. Serum samples showed positive reaction against *Leptospira interrogans* serogroups/serovars *Icterohaemorrhagiae icterohaemorrhagiae*, *Grippothyphosa grippothyphosa* and *Sejroe hardjo* and the distribution of MAT titer for serogroups/serovars were 1:200, 1:400, 1:800 and 1:1600, respectively. The infection rate was significantly higher in mole rats than house mice ($P < 0.05$). However, there were no significant differences among species and different infection titers.

Keywords : Leptospira, seroprevalence, rodents, dairy cattle.

Introduction

Leptospirosis is an infectious disease of animals and man caused by pathogenic *Leptospira* species. This disease has a world wide distribution and is a public health problem mainly in tropical regions (Levett, 2004). Rodents are known to act as a main reservoir of leptospira (Levett, 2004). In rodents these bacteria multiply in their kidneys and are excreted via urine in the

environment (Songer, 1983). The bacteria can survive for a long time in fresh water, damp soil, marshy fields and mud (Radostitis *et al.*, 2000). Suburb of Mashhad of Khorassan Razavee province is a major site of livestock production in northeast of Iran. The purpose of this survey was to determine the prevalence of *leptospira* infection in the rodents in commercial dairy farms in this area.

Materials and Methods

In total, 115 rodents including 66 mole rats (*Nesokia indica*) and 49 house mice (*Mus*

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musculus) were trapped from 18 commercial dairy cattle farms in suburb of Mashhad. The population ranges of farms were 200 to 2500 dairy cows. The trapped rodents were kept separately for prevention of cannibalism. Blood sample was taken from their heart using syringe with needle gauge No: 18 to 22, separated by centrifugation (2000xg for 5 min) and stored at -20C until they were tested within 2-3 months after collection.

Sera were screened at 1:100 dilution against 22 live antigens using the microscopic agglutination test (MAT) as described by Cole *et al.* (1979). Positive sera were those that developed 50% agglutination. Saline and negative serum controls were conducted routinely. The MAT titer with 1:100 or greater against one or more of the antigens were considered as positive.

Seroprevalence differences were assessed using χ^2 corrected for continuity (Snedecor and Cochran, 1967). Values of $P < 0.05$ were considered significant. Variables included in the statistical analysis were: rodent species, different serogroups/serovars and antibodies titers.

Results and Discussion

A wide range of wild life species are natural or accidental hosts of *leptospira*. Rodents are the main carriers of leptospires and are very important reservoirs of infection for human and domestic animals (Hataway and Blackmore, 1981).

Overall 25 out of 115 rodents showed positive reaction in MAT (Table 1). The infection rate within mole rats (*Nesokia indica*) was significantly higher than house mice (*Mus musculus*) ($P < 0.05$). Different rodent species may be reservoirs for distinct serovars of leptospires. Rats are mostly the main maintenance hosts of the related serovar *Icterohaemorrhagiae*, but mice are the reservoirs of serovar *Ballum* (Levett, 2004). These significant differences can be due to host adaptation for mole rats. However, seropositive house mice may be infected accidentally. Furthermore, it may be due to physical body differences between mole rats and house mice. The body sizes of mole rats are bigger than house mice; this could increase the chance of exposure to the contaminated food in mole rats.

Samples reacted against *Icterohaemorrhagiae icterohaemorrhagiae*, *Grippotyphosa grippotyphosa* and *Sejroe hardjo* serogroups/serovars. Overall, the leptospires serogroup/serovar *Icterohaemorrhagiae icterohaemorrhagiae* was the most infected leptospires in mole rats and house mice. We recently reported that *L. I. Icterohaemorrhagiae icterohaemorrhagiae* and *L. I. Grippotyphosa grippotyphosa* serogroups/serovars were the most common leptospires in human, dairy cows (Talebkhan Garoussi *et al.*, 2003b) and dogs (Talebkhan Garoussi *et al.*, 2003a) in dairy farms, respectively. In these farms, the most important maintenance hosts may be

Table 1
Prevalence of *leptospira* seropositivity, antigens and titers by MAT in mole rats (*Nesokia indica*) and house mice (*Mus musculus*)

Species	MAT		Serovars			Titers			
	Tested	+ (%)	I. I (%)	G.G(%)	S.H(%)	1:200(%)	1:400(%)	1:800(%)	1:1600(%)
Mole rats	66	20(30.3)*	14(21.2)	5 (7.6)	1(1.5)	8 (40)	7 (35)	4 (20)	1 (5%)
House mice	49	5(10.2)	3 (6.1)	2 (4.1)	-	3 (60)	1 (20)	1 (20)	-

*Significant differences (with CL of 95%), MAT: Microscopic agglutination test.

I. I: *Icterohaemorrhagiae icterohaemorrhagiae*, G. G: *Grippotyphosa grippotyphosa*, S.H.: *Sejro hardjo*.

small feral mammals which may transmit infection to domestic farm animals, dogs and human.

The MAT is the most common serological test which is used for the diagnosis of leptospirosis. It is less useful in diagnosis of chronic disease in maintenance hosts (Levett, 2004). The titer =1:100 are considered as positive. However, we observed that the captured seropositive mole rats (*Nesokia indica*) and house mice (*Mus musculus*) are active infection sources in dairy cattle herd complexes (Table 1).

In this survey the only trapped rodents were mole rats (*Nesokia indica*) and house mice (*Mus musculus*). Therefore, these rodents may be the source of the mentioned leptospiral infection in dairy cattle herds for domestic animals and human.

In conclusion, this investigation strongly suggests that mole rats (*Nesokia indica*) should be considered as a primary reservoir of *Icterohaemorrhagiae icterohaemorrhagiae* and *Grippytyphosa grippytyphosa* serogroups/serovars and house mice (*Mus musculus*) could be infected to these *leptospira* in dairy cattle farms in suburb of Mashhad-Iran.

References

- Cole, J. R., Ellinghausen, H. C. and Rubin, H. L. 1979. Laboratory diagnosis of leptospirosis of domestic animals. Proc. US. Anim. Health Assoc., 83: 189-199.
- Hathaway, S. and Blackmore, D. 1981. Ecological aspects of epidemiology of infection with leptospire of the *Ballum* serogroup in the black rat (*Rattus rattus*) and brown rat (*Rattus norvegicus*) in Newland. J. Hyg. Camb., 87: 427-436.
- Levett, P. N. 2004. Leptospirosis: A forgotten zoonosis? Clin. Applied Immunol. Rev., 4: 435-448.
- Radostitis, O.M., Gay, C.C., Blood, D.C. and Hinchcliff, K. W. 2000. *Veterinary Medicine, A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*. 9th edition. W. B. Saunders Company Ltd., London, pp. 979-980.
- Snedecor, J.G. and Cochran, W.G. 1967. *Statistical Methods*. 6th edition. Iowa State University Press. Ames., pp. 209-210.
- Songer, J.G., Chilelli, C.J., Reed, R.E. and Trautman, R.J. 1983. Leptospirosis in rodents from an arid environment. Amer. J. Vet. Res., 44: 1973-1976.
- Talebkhani Garoussi, M., Vand-e-Ussefi, J., Famil Ghadakchi, H. and Nowrouzian, I. 2003a. The seroepidemiological survey of *Canine Leptospirosis* in shepherded of dairy herds in Mashhad suburb of Iran. J. Fac. Vet. Med. Univ. Tehran, 58: 177-179.
- Talebkhani Garoussi, M., Vand-e-Ussefi, J., Famil Ghadakchi, H. and Nowrouzian, I. 2003b. A seroepidemiological survey of leptospiral infection in dairy cattle herds and their employees in Mashhad suburb of Iran. J. Fac. Vet. Med. Univ. Tehran, 58: 89-94.
- एम.तालेबखान गैरोसी, जे.वान्ड-ए-उसीफी, जे.मेहर्जादा मशहाद (ईरान) के उपनगरीय दुग्ध पशु समूहों के कर्तकदंतियों में लेप्टोसाइरी संक्रमण की सीरमी-व्यापकता।
- छाछठ छछुंदरों और 49 चुहियों को मिलाकर 115 कर्तकदंतियों को खोर्शस्सन राजावी प्रांत मशहाद (ईरान) के 18 व्यावसायिक डेअरी फार्मों से पकड़ा गया। सीरमी प्रतिक्रिया जानने के लिए 22 सजीव एंटीजनों का उपयोग सूक्ष्मदर्शी एग्लुटिनेशन परीक्षण (एमएटी) के लिए किया गया। सीरमी व्यापकता (टाइटर = 100) पर 21.73% थी। लेप्टोस्पाइरा इन्ट्रोगान्स के सीरमी प्रभेद इक्ट्रोहीमोरेजिये इक्ट्रोहीमोरेजिये, ग्रीथोथाइफोसा ग्रीथोथाइफोसा और सेजरोई हार्डजो के लिए सीरम नमूनों की सक्रिय प्रतिक्रिया थी और स्टीरोवारों के लिए एमएटी टाइट्र क्रमशः 1:200, 1:400, 1:800 और 1:1600 था। चुहियों की अपेक्षा छछुंदरों में संक्रमण की दर सार्थकतः अधिक थी। वैसे, प्रजातियों और विभिन्न संक्रमण टाइट्रों में सार्थक अंतर नहीं था।