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

M. Talebkhan Garoussi*, J. Vand-e-Useefee,** J. Mehrzad

*Department of Clinical Sciences
Faculty of Veterinary Medicine
Ferdowsi University of Mashhad
Mashhad - Iran

**Razi Vaccine and Serum Research Institute of Karaj
Karaj - Iran

(Received November 7, 2005; accepted June 26, 2006)

Abstract


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 Icterohaemorragiae icterohaemorragiae, 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 (Radostistis 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 leptospirosis 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
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>
<thead>
<tr>
<th>Specie</th>
<th>MAT Tested</th>
<th>MAT + (%)</th>
<th>Serovars</th>
<th>Serovars (%)</th>
<th>Titters 1:200 (%)</th>
<th>Titters 1:400 (%)</th>
<th>Titters 1:800 (%)</th>
<th>Titters 1:1600 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mole rats</td>
<td>66</td>
<td>20(30.3)*</td>
<td>I. I</td>
<td>14(21.2)</td>
<td>8 (40)</td>
<td>7 (35)</td>
<td>4 (20)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>House mice</td>
<td>49</td>
<td>5(10.2)</td>
<td>G. G</td>
<td>3 (6.1)</td>
<td>-</td>
<td>3 (60)</td>
<td>1 (20)</td>
<td>1 (20)</td>
</tr>
</tbody>
</table>

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

---

$\text{musculus}$
Seroprevalence of leptospira

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 *Grippotyphosa grippotyphosa* serogroups/serovars and house mice (*Mus musculus*) could be infected to these *leptospira* in dairy cattle farms in suburb of Mashhad-Iran.

**References**


