

**Prevalence of Leptospirosis Antibodies in the European Hare
(*Lepus europaeus* Pall.) in the District of Břeclav**

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Received October 24, 2002

Accepted September 22, 2003

Abstract

Tremel F., J. Pikula, Z. Holešovská: *Prevalence of Leptospirosis Antibodies in the European Hare (Lepus europaeus Pall.) in the District of Břeclav*. Acta Vet. Brno 2003, 72: 377-381.

Between 1999 to 2001 a total of 604 blood sera from the European hare (*Lepus europaeus* Pall.) from the district of Břeclav were examined for the presence of anti-leptospiral antibodies. Positive reactions were found in 96 cases (i.e. 15.89%). Antibodies were found every year of the study. The incidence, however, differed (13.15%, 10.28%, 28.85%). The examined positive sera reacted only with *L. grippityphosa* (93.75%) and *L. grippityphosa* / *L. bulgarica* (6.25%). Most reactions were at the titre of 100 (41 cases of reactions against *L. grippityphosa* and *L. bulgarica*; 40.18%), whereas the least number of reactions was found at the titre of 3200 (4 cases; 3.91%).

It was found that the European hare is susceptible to the infection by leptospires and the etiological structure of leptospiral antibodies corresponds to that in other small mammals. Blood sera of the European hare thus could be used for purposes of monitoring the leptospiral foci in the nature. The European hare plays only a limited role in direct infection of humans or persistence of the natural focus of leptospirosis. It is, however, necessary to be careful when handling game animals.

Leptospirosis, antibodies, L. grippityphosa, European hare

The European hare (*Lepus europaeus* Pall.) is an important game animal in the Czech Republic where it is distributed throughout more than 80% of hunting grounds. It is important both from economic and hunting aspects. The economic importance depends both on its population density, venison production and export entity.

Recently, there has been growing attention paid to control of the health status of the European hare in the hunting grounds. Among free-living animals, this species acts as a very sensitive bio-indicator reacting to all adverse environmental influences. Infections and parasitic diseases belong, no doubt, to important biotic factors influencing the hare populations. The epizootiological importance of the European hare lies mainly in the fact that it is a game animal inhabiting limited areas, home ranges, thus increasing the risk of outbreak of a number of infections and parasitic diseases. Apart from common diseases such as staphylococcosis, hemorrhagic septicaemia, pseudotuberculosis and brucellosis, the European hare may host zoonotic agents including tularaemia, listeriosis, toxoplasmosis and leptospirosis.

As a part of monitoring of the occurrence of tularaemia in the European hare in South Moravia, we collected blood sera of specimens shot and examined them for the presence of antibodies against leptospires.

Materials and Methods

During three years (1999 to 2001) a total of 604 blood sera of the European hare specimens shot in various hunting grounds of the Břeclav district were obtained and examined. In 1999, 2000 and 2001 blood sera amounted to 228, 175 and 201, respectively. Blood was collected by heart puncture of specimens shot during autumn hunting events. It was then centrifuged and the serum obtained used in the reaction of micro-agglutination lysis with 12

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strains of leptospires according to the standard methods (Sebek 1979) using following serotypes of leptospires at the basic titre of 100: 1. *L. grippityphosa* – P125; 2. *L. icterohaemorrhagiae* – Fryšava; 3. *L. sejroe* – M84; 4. *L. canicola* – C7; 5. *L. bratislava* – Jež Bratislava; 6. *L. pomona* – Šimon; 7. *L. arborea* – M7; 8. *L. sorex jalna* – Sorex Jalna; 9. *L. bulgarica* – Nikolaevo; 10. *L. bataviae* – Moldava; 11. *L. tarassovi* – S42; 12. *L. pyrogenes* – Salinem. Sera reacting at the basic titre of 100 were further examined with the respective strain up to the highest titre.

Results

Antibodies against leptospires of various serotypes in the European hare specimens were found in every year of the study. Their incidence, however, varied between 1999 and 2001 (13.15%, 10.28%, 28.85%, respectively). A total of 96 positive reactions (i.e., 15.89%) were found. The highest proportion of positive reactions was found in 2001 (58 cases), while in 1999 and 2000 it was considerably lower (30 and 18 cases, respectively; see Fig. 1). Antibodies against only two serotypes were found (*L. grippityphosa* and *L. bulgarica*). A total of 90 examined sera (93.75%) reacted with one serotype, i.e., *L. grippityphosa*. The remaining 6 cases (6.25%) reacted with both leptospiral serotypes, i.e., *L. grippityphosa* and *L. bulgarica*. Antibodies against the *L. bulgarica* serotype were always found as co-agglutinations together with the anti-*L. grippityphosa* antibodies. No other positive reactions with other leptospiral serotypes were found (see Fig. 2).

Considering the titre, reactions varied from 100 to 3200. Most reactions against the

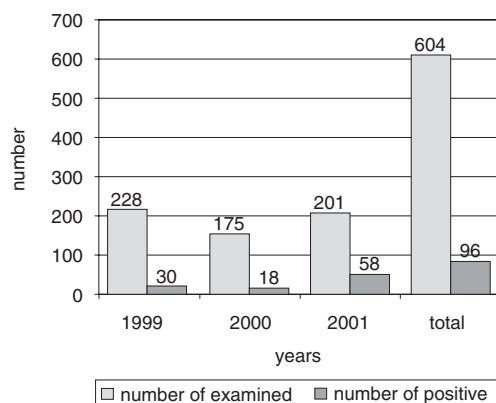


Fig. 1. Results of blood sera examinations for the presence of antibodies against leptospires in the European hare in 1999-2001

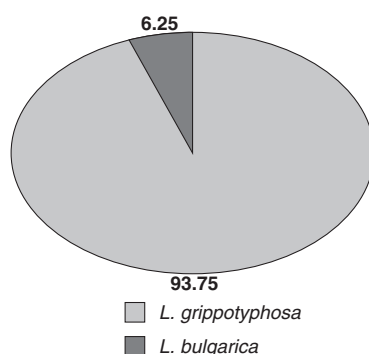


Fig. 2. Serotypes of antibodies found

serotype of *L. grippityphosa* were at the titre of 100 (37 cases; 36.26%), while least reactions amounted up to the titre of 3200 (4 cases; 3.91%). Antibodies against *L. bulgarica* were found only at low titres with concurrent much higher titres against *L. grippityphosa* (see Fig. 3).

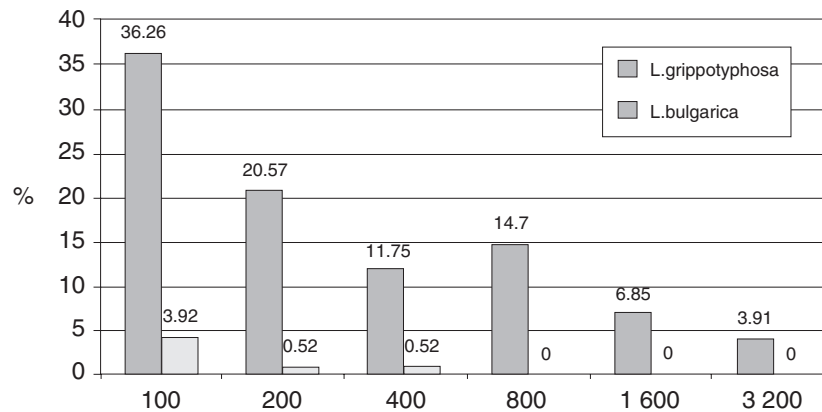


Fig. 3. Titres of antibodies against leptospire found in European hare blood sera

Discussion

Serology of blood sera of the European hare specimens resulted in finding antibodies against the *L. grippityphosa* serotype and occasionally *L. bulgarica*. The seropositivity of examined sera varied around 16%. From the results it is clear that the European hare specimens get into contact with leptospire in their environment. Similar results were previously obtained by Sebek and Vosta (1958) and Vosta (1961) studying antibodies against leptospire in this species in the regions around Tábor and Jihlava, as well as Asmera (1960) in the region of Ostrava, more recently Tremel and Nesňalová (1993) and Zitek and Babicka (2000). According to the above-cited papers, the serological positivity of the European hare amounted to 10%, on average. In some areas, however, up to 25% of specimens were positive, whereas in others the anti-leptospiral antibodies were not found at all. Like in our results, these authors found antibodies against *L. grippityphosa* to be prevailing. Asmera (1991) confirmed the presence of this serotype of leptospire in the European hare by culture. Similar results were published by some authors in other countries. Zanni et al. (1995) confirmed the presence of antibodies against leptospire in 6.8% of hares imported from Poland and the Czech Republic. Antibodies against leptospire in hares were, for example, found by Hartman and Broekhuizen (1980) in the Netherlands, Giraud et al. (1985) in Spain, Borcic et al. (1989) in Croatia, Dedek et al. (1990), Geuchen (1993) and Kwapil (1993) in Germany, Trifunovic et al. (1991) in Serbo-Croatia, and others. The serotypes found by these authors, however, differed from ours. In our opinion, it is due to the difference in the occurrence of natural foci of specific serotypes of leptospire in a given area where the material comes from. Under conditions of the Czech Republic, foci of the *L. grippityphosa* serotype clearly prevail. This serotype is often responsible for up to 90% of positive reactions in animals examined (Sebek and Rosický 1974). The common vole (*Microtus arvalis*) is the main reservoir animal of this serotype of leptospire in the Czech Republic with a seropositivity of up to 42.5% (Sebek and Rosický 1974). As this species occurs throughout the territory and biocoenoses of the Czech Republic, we can expect the presence of foci of leptospirosis anywhere. The European

hare inhabiting more or less the same habitats can thus get into direct or indirect contact with this infectious agent. Reactions of the *L. bulgarica* serotype can only be considered as co-agglutinations with *L. grippotyphosa*. This is also evidenced by relatively low titres of this serotype. This has to be considered when diagnosing diseases caused by leptospires in order not to misinterpret the results. Titres of antibodies against the *L. grippotyphosa* serotype also do not reach high levels so we can speculate that the European hare serves only as a chance reservoir of leptospires and has a limited importance for the maintenance of the foci. It is, nevertheless, necessary to be careful when handling the game animals shot, in particular, when emptying the urinary bladder to prevent direct contact of urine and skin injuries and abrasions because it is in urine that the leptospires are passed to the external environment.

Výskyt protilátek proti leptospirám u zajíce polního (*Lepus europaeus* Pall.)

V letech 1999-2001 bylo vyšetřeno 604 krevních sér zajíce polního (*Lepus europaeus* Pall.) z břeclavského okresu. Pozitivní reakce byly prokázány v 96 případech (15,89%). Protilátky proti leptospirám byly zjišťovány v každém sledovaném roce, ale s různou incidencí positivity (13,15%, 10,28%, 28,85%). Vyšetřovaná pozitivní séra reagovala pouze s leptospirami *L. grippotyphosa* (93,75%) a *L. grippotyphosa/L. bulgarica* (6,25%). Vyšetřovaná séra reagovala nejčastěji v titru 100 a to v 41 případech reakcí proti *L. grippotyphosa* a *L. bulgarica* (40,18%), zatímco nejméně reakcí bylo prokazováno v titru 3200 a to 4 případy (3,91%).

Bylo prokázáno, že zajíc polní je vnímavý k infekci leptospirami, přičemž zjišťovaná etiologická struktura leptospirových protilátek koresponduje s výskytem protilátek u drobných zemních savců. Krevní séra zaječích zvířat by bylo možno využít v rámci monitoringu ohnisek leptospiroz v přírodě. Pro přímou infekci člověka a udržování přírodního ohniska má zajíc polní význam pouze omezený, přesto je třeba věnovat zvýšenou pozornost manipulaci se zvířaty.

Acknowledgements

This work was supported by the Grant Agency of the Czech Republic (No. 524/00/1122).

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