

## Echinococcosis in Dogs in the Czech Republic

V. SVOBODOVÁ, B. LENSKÁ

Department of Parasitology, Faculty of Veterinary Medicine,  
University of Veterinary and Pharmaceutical Sciences Brno, Czech Republic

Received March 6, 2002

Accepted June 19, 2002

### Abstract

Svobodová V., B. Lenská: *Echinococcosis in Dogs in the Czech Republic*. Acta Vet. Brno 2002, 71: 347-350.

In central Europe, foxes are principal definitive hosts of *Echinococcus multilocularis*. However, dogs may become definitive hosts too, and due to close contact with humans they may be the source of infection. We examined samples of dog faeces from the areas with high density of red foxes. The dogs were rigorously selected on the basis of specific individual history confirming predator habits and a possibility of free movement allowing the dogs to hunt for rodents. Samples of dog faeces were examined by ELISA detecting specific coproantigens *Echinococcus* spp. (CHEKIT – Echinotest, Bommeli, Switzerland). A total of 186 samples of dog faeces were examined with 15 positive cases detected (8.1%).

*Echinococcus multilocularis*, coproantigens, ELISA, zoonosis, prevalence

Parasitic diseases with zoonotic potential present a significant health problem worldwide. *Echinococcus multilocularis*, a small tapeworm of Taeniidae family, also belongs among zoonotic helminths. Its occurrence is especially linked to the fox as the definitive host. However, dogs and cats may become definitive hosts as well. In particular the animals that may hunt murids and that live in close contact with humans present a considerable risk. Such animals may also become source of the disease for humans.

In the conditions of central Europe red fox (*Vulpes vulpes*) is the main definitive host of this parasite (Thompson and Eckert 1983; Dubinský et al. 1999). Other definitive hosts may include the dog (*Canis familiaris*) (Deplazes et al. 1999) and the cat (*Felis catus f. domestica*) (Deblock et al. 1989; Petavy et al. 1988). Small rodents are becoming intermediate hosts. On the territory of the Czech Republic, they are represented in particular by common vole (*Microtus arvalis*) (Kolářová 1999). The eggs of *E. multilocularis* may cause alveolar echinococcosis in humans, which is a dangerous zoonosis. The prevalence of alveolar echinococcosis in the endemic areas of central Europe ranges between 0.03 and 1.2 per 100,000 inhabitants (Eckert and Deplazes 1999).

The objective of the present work was to establish the prevalence of *E. multilocularis* in dogs that live in and move around the areas with dense population of red foxes.

### Materials and Methods

During the period of 2000 to 2001 samples of faeces were collected from dogs especially from the areas where the occurrence of *E. multilocularis* in red foxes was reported earlier (Pavlásek 1998; Martínek et al. 2001) or where it was indicated by the data provided by district offices of the State Veterinary Administration. The dogs were selected for the examination strictly on the basis of specific individual history confirming predator habits and a possibility to move around freely and to hunt for rodents. The numbers of samples of dog faeces from different localities with confirmed prevalence of *E. multilocularis* were as follows: 44 samples from a locality with 63.3% prevalence, 52 samples from another locality also with 63.3% prevalence, 4 samples from a locality with 6.6% prevalence, 6 and 39 samples from two distant localities with equally 28.6% prevalence. Samples were also taken from two localities where the occurrence in red foxes had not been confirmed (24 and 5 samples) and from one locality where no examination in red foxes had been carried out (12 samples).

#### Address for correspondence:

Doc. MVDr. Vlasta Svobodová, CSc.  
Department of Parasitology, Faculty of Veterinary Medicine  
University of Veterinary and Pharmaceutical Sciences Brno  
Palackého 1-3, 612 42 Brno, Czech Republic

Phone: + 420 5 4156 2265  
Fax: + 420 5 4924 8841  
E-mail: svobodovav@vfu.cz  
<http://www.vfu.cz/acta-vet/actavet.htm>

The samples of dog faeces were stored at  $-18^{\circ}\text{C}$  and  $-80^{\circ}\text{C}$  until tested. One g of every sample was used for investigation. Samples of dog faeces were examined by ELISA for the detection of specific coproantigens of *Echinococcus* spp. (CHEKIT – Echinotest, Bommeli, Switzerland).

### Results

A total of 186 samples of dog faeces were examined. Coproantigens *Echinococcus* spp. were detected in 15 samples (8.1%), 171 samples (91.9%) were found negative.

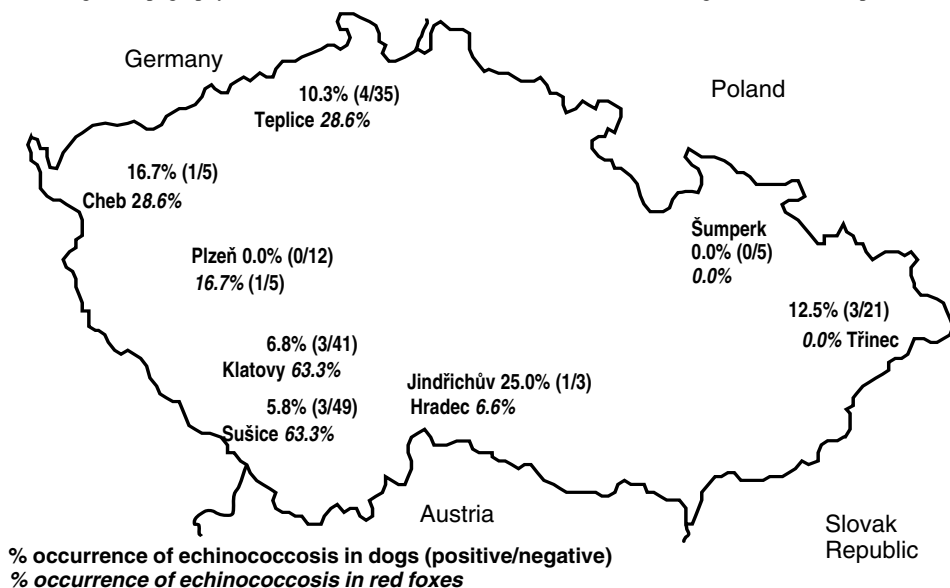
The summary of the results of examinations in dogs with breakdown by different areas with various levels of *E. multilocularis* prevalence in red foxes is presented in Table 1. Topography of different localities with confirmed echinococcosis in red foxes and dogs is depicted in Fig. 1.

Table 1  
Comparison of the values of echinococcosis prevalence in red foxes and dogs

Prevalence in red foxes in the area	Prevalence in dogs in the area				
	%	Total Number	Number of positive cases	Percentage of positive cases	Percentage of negative cases
63.3**	44	3	6.8	41	93.2
63.3**	52	3	5.8	49	94.2
6.6*	4	1	25	3	75
28.6*	6	1	16.7	5	83.3
28.6*	39	4	10.3	35	89.7
0	24	3	12.5	21	87.5
0	5	0	0	5	100
No examined	12	0	0	12	100
Grand total	186	15	8.1	171	91.9

\*Pavlásek 1998; \*\*Martínek et al. 2001

Fig. 1. Topography of the occurrence of echinococcosis in red foxes and dogs in the Czech Republic



### Discussion

The overview of epidemiological situation in the Czech Republic was prepared by Kolářová (1999). The occurrence is known in particular in foxes as the principal definitive hosts of *Echinococcus multilocularis*. Average prevalence was determined at 19.7% on the basis of monitoring during the period of 1994–1999, when intestines of red foxes which had been shot and found negative for rabies were examined (Pavlásek 1998). In some localities, especially in southern Bohemia, much higher values of prevalence at 70.6% (Pavlásek 1998) and 63.3% (Martínek et al. 2001) were found. Dogs and cats were confirmed as facultative definitive hosts by Čada et al. (1999), who diagnosed *post mortem* the infection in a kitten, and by Martínek et al. (1999), who demonstrated presence of *E. multilocularis* in one case (1.8%) out of 55 samples of dog faeces collected on the streets of a small village in southern Bohemia.

There are not much data available on the occurrence of echinococcosis in dogs, because the *post mortem* diagnosis, which is normally used in red foxes, cannot be applied in dogs in large scale. Therefore mostly intravital methods are used. Average prevalence detected in our group of dogs was 8.1%. Positive samples of dog faeces originated also from the localities, where no occurrence of *E. multilocularis* was confirmed during recent years. It can be expected that at the level of 12.5% of positive samples of dog faeces the infection in red foxes does not occur at present. The prevalence of echinococcosis in dogs in the Czech Republic seems to be at a higher level, because for instance in Switzerland coproantigens were detected by ELISA in dogs in 0.3% only (Deplazes et al. 1999). Higher values of prevalence, diagnosed in dogs in the Czech Republic, correspond to our strategy of sampling, since the animals originated from the areas where the density of red foxes was high. Moreover, the owners reported that the animals selected had a possibility to move freely and to hunt for rodents. A similar situation with higher occurrence of echinococcosis in dogs in an endemic locality in Switzerland was described by Deplazes et al. (1998), who detected coproantigens in 9% of dogs on farms. Although the statement of positive detection in the areas where only low numbers of samples were obtained, may not be completely objective, it certainly shows that echinococcosis is not rare in the given locality. If the group of dogs sampled had been randomly selected from different parts of the country including large cities, the number of positive cases would be probably lower.

The detection of coproantigens specific for *Echinococcus* spp. by ELISA is genus-specific. However, on the basis of epidemiological situation in the Czech Republic and with regard to characteristic features of the group of dogs selected we assume that the agent was mainly *Echinococcus multilocularis*. Compared with SCT (Intestinal Sedimentation and Counting Technique, Rausch et al. 1990), the method used has a sensitivity of 80% and a specificity of 95–99% (Deplazes and Eckert 1996). Therefore we continue to store positive samples for PCR examination for the purpose of final diagnosis.

Although the occurrence of *E. multilocularis* in the definite hosts is not rare at all, the disease in humans develops only seldom (Kreidl et al. 1998; Auer and Aspöck 2001). A single case of alveolar echinococcosis was reported in humans in the Czech Republic (Šlais et al. 1979). Nevertheless the danger of infection must be prevented. The dogs that may be exposed should be dewormed on a regular basis every three months with praziquantel or epsiprantel (Deplazes and Eckert 2001).

### Výskyt echinokokózy psů v České republice

Echinokokóza patří k nebezpečným zoonózám parazitárního původu. Hlavním definitivním hostitelem *Echinococcus multilocularis* ve střední Evropě jsou lišky, ale mohou jím být i psi, kteří vzhledem k těsnému kontaktu představují potenciální zdroj

infekce pro člověka. Vyšetřovali jsme vzorky trusu psů žijících v oblastech s hojným výskytem lišek. Psi byli vybíráni striktně na základě cílené anamnézy potvrzující predátorské sklony a možnost volného pohybu spojeného s lovem hlodavců. Vzorky trusu psů byly vyšetřeny metodou ELISA k detekci specifických koproantigenů *Echinococcus* spp. s využitím setu CHEKIT – Echinotest firmy Bommeli, Švýcarsko. Z celkového počtu 186 vzorků trusu psů bylo 15 pozitivních (8,1 %). I když k rozvoji onemocnění u člověka dochází zřídka, je třeba nebezpečí předcházet a u psů patřících do exponované skupiny provádět cíleně pravidelnou dehelmintizaci.

#### Acknowledgement

This study was supported by the Research Grant of the Ministry of Education of the Czech Republic No.1267/2001.

#### References

- AUER, H, ASPÖCK, H 2001: Human alveolar echinococcosis and cystic echinococcosis in Austria: The recent epidemiological situation. *Helminthologia* **38**: 3-14
- ČADA, F, MARTÍNEK, K, KOLÁŘOVÁ, L 1999: Domestic cat (*Felis catus* f. dom.) as the final host of *Echinococcus multilocularis* tapeworms. *Veterinářství* **49**: 2-3
- DEBLOCK, S, PROST, C, WALBAUM, S, PETAVY, AF 1989: *Echinococcus multilocularis*: a rare cestode of the domestic cat in France. *Int J Parasitol* **6**: 687-688
- DEPLAZES, P, ALTHER, P, TANNER, I, THOMPSON, RCA, ECKERT, J 1999: *Echinococcus multilocularis* coproantigen detection by enzyme-linked immunosorbent assay in fox, dog and cat populations. *J Parasitol* **85**: 115-121
- DEPLAZER, P, ECKERT, J 2001: Veterinary aspects of alveolar echinococcosis – a zoonosis of public health significance. *Vet Parasitol* **98**: 65-87
- DEPLAZES, P, ECKERT, J, 1996: Diagnosis of the *Echinococcus multilocularis* infection in final hosts. *Appl Parasitol* **37**: 245-252
- DEPLAZES, P, HOFER, S, GLOOR, S, GOTTSTEIN, B, ECKERT, J 1998: Urbaner Zyklus von *Echinococcus multilocularis* und Untersuchungen zur epidemiologischen Rolle von Hunden und Katzen als Endwirte. Abstracts, 18. Tagung der Deutschen Gessellschaft f. Parasitologie, Dresden
- DUBINSKÝ, P, SVOBODOVÁ, V., TURČEKOVÁ, L., LITERÁK, I., MARTÍNEK, K, REITEROVÁ, K., KOLÁŘOVÁ, L, KLIMEŠ, J, MRLÍK, V 1999: *Echinococcus multilocularis* in the Slovak Republic: The first record in red foxes (*Vulpes vulpes*). *Helminthologia* **36**: 105-110
- ECKERT, J., DEPLAZES, P. 1999: Alveolar Echinococcosis in humans: The Current Situation in Central Europe and the Need for Countermeasures. *Parasitol Today* **15**: 315-319
- KOLÁŘOVÁ L. 1999: *Echinococcus multilocularis*: new epidemiological insights in Central and Eastern Europe. *Helminthologia* **36**: 185-191
- KREIDL, P, ALLERBERGER, F, JUDMAIER, J, AUER, H, ASPÖCK, H, HALL, AJ 1998: Domestic Pets as Risk Factors for Alveolar Hydatid Disease in Austria. *Am J Epidemiol* **147**: 978-981
- MARTÍNEK, K, ČERVENÝ, J, KOLÁŘOVÁ, L, STRNADOVÁ, L, 1999: Occurrence of *Echinococcus multilocularis* in carnivora in the district Klatovy (West Bohemia). *Helminthologia* **36**: 132
- MARTÍNEK, K, KOLÁŘOVÁ, L, ČERVENÝ, J 2001: *Echinococcus multilocularis* in carnivores from the Klatovy district of the Czech Republic. *J Helminthol* **75**: 61-66
- PAVLÁSEK, I. 1998: Actual situation in the occurrence of *Echinococcus multilocularis* in red foxes in Europe and in the Czech Republic. *Rem-Klin Mikrobiol* **2**: 233-240
- PETAVY, AF, PROST, C, GEVREY, J, GILOT, B, DEBLOCK, S: 1988: Infestation naturelle du chat domestique (*Felis catus* L.) par *Echinococcus multilocularis* Leucart, 1863 (Cestoda): premier cas en France décelé en zone peri-urbaine. *CR Acad Sci III Vie* **307**: 553-556
- RAUSCH, RL, FAY, FH, WILLIAMSON, FSL 1990: The ecology of *Echinococcus multilocularis* (Cestoda: Taeniidae) on St. Lawrence Island, Alaska. II. Helminth populations in the definitive hosts. *Annales Parasitol Hum Comp* **65**: 131-140
- ŠLAIS, J, MÁDLE, A, VANKA, K, JELÍNEK, F, ČERNÍK, V, PRŮCHOVÁ, M, JINDRA, J 1979: Alveolar hydatidosis (echinococcosis) diagnosed by liver puncture biopsy. *Časopis lékařů českých* **118**: 472-475
- THOMPSON RCA, ECKERT J 1983: Observation on *Echinococcus multilocularis* in the definitive host. *Z Parasitenkunde* **69**: 336-34