

## Cystic echinococcosis in Slovakia – human cases and seroepidemiological study

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Cystic echinococcosis (CE) is serious parasitic disease caused by worldwide distributed tapeworm, *Echinococcus granulosus* sensu lato (s.l.). Humans are considered accidental hosts and the disease presents as cysts localised predominantly in the liver and less frequently in lungs or other organs. According to current nomenclature *E. granulosus* s.l. has been subdivided into divided into five species, *E. granulosus* sensu stricto (s. s.), *E. felidis*, *E. equinus*, *E. ortleppi* and *E. canadensis* (Romig et al. 2015). In Slovakia, only the occurrence of *E. canadensis*, formerly G7 or pig strain was reported in pigs and humans (Šnábel et al. 2016). The study aimed to identify causative agent of cystic echinococcosis in three human patients and perform epidemiological survey to recognise infection risk in different groups of participants.

Biological material obtained during the surgery from three patients was examined by PCR. Two mitochondrial genes, *nad1* and *cox1* were amplified subsequently sequenced. Within the epidemiological study, the presence of specific antibodies in serum samples was detected serologically by ELISA method using three *E. granulosus* antigens, antigen B (AgB), hydatid fluid (AgHT) and protoscolex antigen (AgP). Consequently, seropositivity was verified by Western blot analyses using *Echinococcus* Western Blot IgG (LDBIO Diagnostics, Lyon, France).

Molecular analyses revealed that the etiological agent of cystic echinococcosis in a woman from eastern Slovakia recorded in 2014 was *E. canadensis* (G7). In two men from western Slovakia diagnosed in 2014 and 2019, respectively, *E. granulosus* s. s. (G1) was confirmed. Unfortunately, detailed epidemiological anamnesis of patients is not known at present, therefore autochthonous origin of the disease could not be confirmed. Seroepidemiological study shown the presence of antibodies to *E. granulosus* in 12 (0.99%) samples of 1214 examined by ELISA methods with the highest positivity (2.53%) recorded in the group of 198 veterinarians (Table 1). Subsequent Western blot analyses did not confirmed positivity in any serum sample.

Our results suggest that although the epidemiological study did not confirm the seropositivity to *E. granulosus* in studied groups of participants, the etiological agent of the disease is still present in Slovakia. Moreover, the first detection of *E. granulosus* s. s. (G1) in human patients potentiate the need of further studies in animals and humans to find out the real situation regarding the autochthonous occurrence of this genotype in the country.

Table 1 seropositivity to *E. granulosus* in different groups of population in Slovakia

Group	N/n/%	95% CI
Hunters, foresters	127/1/0.79	<0.01–4.76
Veterinarians	198/5/2.53	0.92–5.94
Farmers	218/1/0.46	<0.01–2.82
Soldiers	304/1/0.33	<0.01–2.03
Students of Veterinary Medicine	122/3/2.46	0.52–7.30
University Students	97/0/0.00	*
Common population	148/1/0.68	<0.01–4.11
TOTAL	1214/12/0.99	0.55–1.74

N – number of examined; n – number of positive; \* – not analysed.

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