Helminth fauna of the northern white-breasted hedgehog (*Erinaceus roumanicus*) in Serbia

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Abstract The result of helminthological examination of 28 hedgehogs died at traffic accident and 12 samples of feces collected from pets hedgehogs during 2013–2015 were presented. Three species of helminths were found: *Crenosoma striatum*, *Hymenolepis erinacei* and *Aonchotheca erinacei*. This is the first research of parasitic fauna of hedgehogs in Serbia.

Keywords Hedgehogs · Helminth · Serbia

Introduction

Hedgehogs are small mammals, insectivores and fall under the family Erinaceidae. The main characteristic of this family is the presence of spines on their bodies, here are sixteen extant species of spiny hedgehog in five genera, found through parts of Europe, Asia, Africa and New Zealand (where is introduced). On the territory of Europe live North African hedgehog—*Atelerix algirus*, western European hedgehog—*Erinaceus europaeus* and northern white-breasted hedgehog—*Erinaceus roumanicus*. The range of the *E. roumanicus* extends in the west as far as Poland, Austria and the former Yugoslavia (including Serbia), and south to Greece and the Adriatic Islands. It is found eastwards through Russia and Ukraine, as far east as the Ob River in Siberia (Wilson and Reeder 2005). It is widespread throughout this range, and there are no signs of a significant population decline.

Hedgehogs usually move at night and spend most of the day sleeping in a hole in the ground or hidden under grasses, shrubs and stones. Usually, they forage within a radius of 200–300 m around their nests, and this is their home range, but sometimes they cover distance of several kilometers. These mammals are quite common in urban environments (for example, in gardens, parks and backyards, city forest, picnic area and cemeteries.) (Dowding et al. 2010). At last few years, these animals have become increasingly popular as an exotic household pet due to being unique, cute, low and easy maintenance pets.

Research of parasitic fauna of hedgehogs is mostly conducted in Europe and the Middle East (Saupe 1988; Matuschka 1984; Majeed et al. 1989; Beck 2007; Youssefi et al. 2013). In Serbia, this is the first research of parasitic fauna of hedgehogs.

Materials and methods

Between April 2013 and December 2015, we examined 28 hedgehogs died at traffic accident and 12 samples of feces were collected from pets hedgehogs. Died animals were originated from Belgrade areas, Zasavica (nature reserve northwest of Belgrade) and Pančevo.

Dead hedgehogs were examined by necropsy. The contents of each organ—lungs, trachea, heart, liver and the digestive tract (stomach, small intestine and large intestine)—were separated, placed in Petri dishes and examined with stereomicroscope. All of the isolated helminths from each part of the body were counted, fixed and preserved in 70 % ethanol.

Collected fecal samples from pets and died hedgehogs (feces were taken from the rectum during dissections) in an

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amount of 2 g were examined by Sheather's flotation (in saturated sugar dilution).

Helminths were determined by the key given by Skrjabin et al. (1970), Khalil et al. (1994) and Anderson (2000).

Results and discussion

Infection with helminths was found in 42.85 % (12/28) of hedgehogs examined by necropsy. Polyparasitism involving two species was detected in 28.57 % (8/28) of examined animals. During necropsy, we found *Crenosoma striatum* in lungs of 4 (14.28 %) animals, and in small intestine, we occurred *Hymenolepis erinacei* at 7 (25.0 %) and *Aonchotheca erinacei* at 9 (32.14 %).

Coprological examination of pets hedgehogs revealed the presence of eggs of *A. erinacei* at 5 (41.66 %) and *C. striatum* and *H. erinacei* at 4 (33.33 %) hedgehogs. Coprological examination of a dead hedgehogs coincides with the autopsy findings.

In total, *A. erinacei* was most abundant helminth species occurred at 35.00 % (14/40), followed by *H. erinacei* 27.50 % (11/40) and *C. striatum* found at 20.00 % (6/40) of examined hedgehogs.

Epidemiological studies on the parasite fauna of hedgehogs conducted in Germany, Norway, Britain and Italy established that *C. striatum* was the common parasites of the lung in hedgehogs (Majeed et al. 1989; Epe et al. 2004; Gaglio et al. 2010).

During our examination, we found two helminth species *H. erinacei* and *A. erinacei*. This species is usually found at hedgehogs at numerous European countries (Poland, Britain, Germany, Italy) and in the Middle East (Turkey, Iran) (Carlson 1980; Boag and Fowler 1988; Cirak et al. 2010; Mizgańska-Wiktor et al. 2010; Youssefi et al. 2013). These helminth species, together with *Aonchotheca* spp. and *Nephridiakanthus major*, presented the dominant intestinal parasites of hedgehogs.

Our studies show that the parasitic fauna of hedgehogs in Serbia is no different from parasites species that are found in other parts of Europe. On it certainly influenced the presence of the same species of intermediate host of helminths, climate and habitat conditions.

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