

Original papers

Preliminary coproscopic examination of tortoises in the City Zoological Garden in Wroclaw, Poland

Katarzyna Buńkowska, Anna Okulewicz, Agnieszka Perec-Matysiak, Joanna Hildebrand

Department of Parasitology, Institute of Genetics and Microbiology, Wroclaw University, 63/77 Przybyszewskiego Street, 51-148 Wroclaw, Poland

Corresponding author: Anna Okulewicz; E-mail: anna.okulewicz@microb.uni.wroc.pl

ABSTRACT. Tortoises are a novelty in the world of pets. Although a great deal of information has been acquired on the internal medicine and surgery on these animals, little is known of their parasitological fauna. Fecal samples of 11 species of tortoises housed in the City Zoological Garden in Wroclaw were examined. Eggs of parasitic helminths were isolated using flotation and sedimentation techniques. The overall prevalence was 81.2%. Two groups (Nematoda and Trematoda) of endoparasites were found. Oxyurid eggs were found almost in every animal examined. Co-infection with oxyurids and ascarids was recorded for *T. horsfieldii* and *T. marginata*. Three species of tortoises were infected by digenic trematodes.

Key words: tortoises, helminths, coprological examination, zoo garden

Introduction

The order Chelonia contains a group of animals that evolved into a shelled form millions of years ago and is considered the most primitive group of living reptiles. Chelonians include turtles, tortoises and terrapins and these terms have different meanings in different parts of the world. In the United States, tortoises refer to terrestrial animals, turtles usually to aquatic or semiaquatic and terrapins – to semiaquatic, hard-shelled chelonians. These animals are becoming very popular as pets especially in Europe where there is a long history of keeping the Mediterranean *Testudo* species as garden pets. Although the report from the CDC [1] discourages the adoption of tortoises as pets, the appearance of this „living fossil" has favored the change of its role in the modern human society from an „ornamental" garden animal to a unconventional pet living inside our houses [2]. According to Rivera [3] there are hundreds of species of chelonians kept in captivity.

Chelonians are not susceptible to as many varieties of parasites as most mammals, birds and other reptiles are plagued with. It is little known about most parasites of these animals and, for many, we have no idea whether the parasites are pathogens or benigns (commensals). However, there are several parasites that can cause severe problems, if they are not properly treated. Most parasitic problems occur when reptiles are either kept in close captivity with other animals or when kept in unsanitary conditions (e.g. dirty water, without proper protection against insects).

The aim of this study was to determine the occurrence of intestinal helminths from tortoises housed in the City Zoological Garden in Wroclaw.

Material and methods

The coprological examination was carried out on 11 species of chelonians: Hermann's Tortoise (*Testudo hermanni*), Horsfield's Tortoise (*Testudo horsfieldii*), Marginated Tortoise (*Testudo marginata*), Leopard Tortoise (*Stigmochelys pardalis*), Asian Forest Tortoise (*Manouria emys*), Bell's Hinged Tortoise (*Kinixys belliana*), Elongated Tortoise (*Indotestudo elongata*), Radiated Tortoise

Table 1. General information on the tortoises species examined and their parasites

Host species	Origin	Diet	Parasites		
			Digenea	Nematoda	
				Pharyngodonidae	Ascarididae
Astrochelys radiata	Madagascar	herbivores	+	+	–
Chelonoides nigra	Galapagos Islands	herbivores	–	+	–
Geochelone elegans	India and Sri Lanka	herbivores	–	+	–
Geochelone sulcata	Africa	herbivores	–	+	–
Indotestudo elongata	Asia	basically herbivores	–	+	–
Kinixys belliana	Africa	omnivores	+	–	–
Manouria emys	Asia	omnivores	+	–	–
Stigmochelys pardalis	Africa	herbivores	–	+	–
Testudo hermanni	Europe	herbivores	–	–	–
Testudo horsfieldii	Asia	herbivores	–	+	+
Testudo morginata	Europe	herbivores	–	+	+

(*Astrochelys radiata*), Galapagos Giant Tortoise (*Chelonoidis nigra*), Indian Star Tortoise (*Geochelone elegans*), and African Spurred Tortoise (*Geochelone sulcata*). That last species deserves special attention because it is rarely encountered in zoological gardens and there is only one individual in Poland in the Wroclaw ZOO. Details about the diet of host species and their origin are presented in Table 1.

The faeces of reptiles were macroscopically examined for the presence of adult parasites. For the eggs presence of intestinal helminths, individual stool samples were examined by routine flotation and sedimentation methods. During flotation procedure a saturated NaCl solution with a specific gravity of 1.2 was used, whereas sedimentation method was performed using tap water. Identification of eggs was conducted under the light microscope.

Results and discussion

As shown by the preliminary coproscopical survey, the overall prevalence of endoparasites in tortoises was 81.2%. The most frequent parasites were oxyurids of the Pharyngodonidae family. According to the literature, oxyurid infection is common among chelonians, especially herbivorous species [2,4–6]. This may be explained mainly by their low pathogenicity, their ability to survive hibernation [7], by the monoxenous life cycles of these parasites and the behavior and ecology of their hosts. We confirmed eggs occurrence of these parasites in 8 different host species. Rataj et al. [6] noticed the occurrence of these parasites in 10 species of chelonians, most frequently in Hermann's Tortoises (92.5%). In our own research the eggs of oxyurids were identified only to the family level, because eggs of pinworms affecting tortoises retrieved at the coprological examination are impossible to identify to species and genus level. Existing data on this nematode group mainly deal with taxonomy and morphological descriptions of adult specimens spontaneously eliminated by the reptiles or retrieved post-mortem [8–12]. According to the above-mentioned articles the following oxyurid genera occur in tortoises: *Tachygonetria*, *Mehdiella*, *Thaparia* and *Alaeuris*. *Tachygonetria* spp. nematodes found in tortoises exhibit a wide geographical distribution, with five species and four subspecies from the Ethiopian region (Madagascar and South Africa), nine Palaearctic species and four subspecies, two species from the Nearctic region (Mexico) and one species from the Neotropical region (Galapagos Islands). This genus occurs in all major biogeographical regions with the exception of the Australian region [10]. The majority of pharyngonid species of Palearctic tortoises, such as *T. horsfieldii*, *T. hermanni*, are members of this genus, while pharyngonid species from Nearctic tortoises *inter alia Gopherus agassizii* are members of *Alaeuris* [8]. There is no indication on the oxyurid fauna from Oriental tortoises (e.g. *G. elegans*, *I. elongata* and *M. emys*), from Central and West Africa (*K. belliana, K. erosa, G. sulcata*) and from Neotropical tortoises [10].

Co-infection of oxyurids and *Angusticaecum holopterum* were noted in each individual of

T. horsfieldii and *T. marginata*. *A. holopterum* has been reported twice in Poland in *Trachemys scripta elegans* obtained from Wroclaw pet shop [13] and from Poznan Zoological Garden [14]. The presence of this parasite has also been recorded in Italy in *Testudo graeca* [4].

In our investigation Trematoda eggs were found in omnivorous tortoises (*M. emys* and *K. belliana)* and in one herbivorous individual of *A. radiata*, which was kept on the grassy outdoor area with other omnivorous chelonians. The high prevalence of Trematoda were found in Marginated Tortoises – 60% and Spur-thighed Tortoises – 26.4% from Lebanon and Slovenia [6].

It is worth to notice that tortoises in the City Zoological Garden in Wroclaw receive constant care of veterinarians. The high prevalence of helminths in examined chelonians indicates that parasites of these animals are difficult to eradicate.

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