

Original papers

Internal parasites of reptiles

Małgorzata Raś-Noryńska, Rajmund Sokół

Department of Parasitology and Invasive Diseases, Faculty of Veterinary Medicine, University of Warmia and Mazury, Oczapowskiego 13, 10-719 Olsztyn, Poland

Corresponding author: Małgorzata Raś-Noryńska; e-mail: malgorzata.ras@uwm.edu.pl

ABSTRACT. Nowadays a growing number of exotic reptiles are kept as pets. The aim of this study was to determine the species of parasites found in reptile patients of veterinary practices in Poland. Fecal samples obtained from 76 lizards, 15 turtles and 10 snakes were examined by flotation method and direct smear stained with Lugol's iodine. In 63 samples (62.4%) the presence of parasite eggs and oocysts was revealed. Oocysts of *Isospora* spp. (from 33% to 100% of the samples, depending on the reptilian species) and Oxyurids eggs (10% to 75%) were predominant. In addition, isolated *Eimeria* spp. oocysts and *Giardia intestinalis* cysts were found, as well as *Strongylus* spp. and *Hymenolepis* spp. eggs. Pet reptiles are often infected with parasites, some of which are potentially dangerous to humans. A routine parasitological examination should be done in such animals.

Key words: reptiles, parasites, coproscopic examination

Introduction

Reptiles kept as exotic pets are increasingly common treated as home decoration. Many of them are collected from the wild at the point of their origin or are the offspring of wild caught animals. Insufficient control of animal origin and health status causes a risk for introduction of various diseases, including parasitoses. Parasitic infections are often chronic and in optimal habitat and maintenance conditions do not give clear clinical symptoms. In contrast, the stress of transport, inadequate microclimate in the terraria, concentration of animals or improper nutrition, can suppress the immune system and lead to clinical form of parasitic diseases. Especially relating to internal parasites, which in nature live in a cohabitation with their host [1]. The reptile population in Poland is unknown, as is the prevalence of parasites they may carry. By Papini et al. [2] approx. 57% of captive-bred reptiles are infected with parasites. This percentage increases to over 90% in the case of animals taken from the wild which are at higher risk of being infected with parasites of complex life cycle [3,4].

The aim of this study was to identify the species of parasites that infected clinically healthy pet reptiles, patients of veterinary practices in Poland.

Material and Methods

In the years 2013–2014 a total of 101 reptile faecal samples were examined. Samples originated from 49 bearded dragons (*Pogona vitticeps*), 2 Chinese water dragons (*Physignathus concinns*), 21 leopard geckos (*Eublepharis macularius*), 15 turtles (10 tortoises, *Testudo horsfieldii*; 4 red-eared sliders, *Trachemys scripta elegans* and 1 of not described species), 10 snakes of the genus *Lampropeltis* spp. and 4 veiled chameleons (*Chamaeleo calytratus*). Faecal samples were provided by veterinarians and breeders. Samples were examined by Fülleborn's flotation method with the Darling's solution (centrifuged 2000 rpm x 6 min.), and direct smear stained with Lugol's iodine. The slides were observed under the light microscope with 200× magnification. Observed eggs or oocysts were properly qualified as parasites and pseudoparasites.

Results

All the reptiles used for this study were asymptomatic. Out of the 101 samples examined, 63 (62.4%) showed the presence of parasitic elements – details shown in Table 1.

In 57.1% of faecal samples taken from bearded dragons contained the Oxyurids eggs and 36.7% oocysts of *Isospora* spp. Also, in 2 animals the presence of *Eimeria* spp. oocysts was revealed and in 2 others eggs of *Strongylus* spp. Oxyurids eggs were found in faeces of one Chinese water dragon.

All 4 examined faecal samples of chameleons contained *Isospora* spp. oocysts and 75% of them also contained Oxyurids eggs. One chameleon was a carrier of *Giardia intestinalis* cysts.

In 66.7% faecal samples from leopard geckos contained Oxyurid eggs, in half of the cases coinfection of *Isospora* spp. was found.

In 26.6% of samples from turtles *Isospora* spp. oocysts were identified and in 13.3% – Oxyurid eggs.

In 40% of the samples taken from snakes the oocysts of the genus *Isospora* spp. were detected. In addition, in one sample Oxyurid eggs and eggs of *Hymenolepis* spp. were found. Tapeworm eggs were classified as pseudoparasites derived from the infected rodents eaten by the snake.

Discussion

According to Jorge et al. [4] single coproscopical examination is not fully reliable, because only about 36% of the reptilian faecal samples showed the presence of parasites that were then found in post-mortem examination. Nevertheless, parasitological examination of faeces is non-invasive and easy to perform. It should be performed especially in all reptiles freshly introduced to the terrarium, during the quarantine period, even if the animals do not show any clinical symptoms. Repeated at 6-month intervals may be the primary diagnostic tool for the assessment of health and welfare of the reptiles. Reptiles tested in the study did not show any specific clinical symptoms for parasitic diseases, although more than 50% of the samples tested were positive. Parasites with the direct life cycle, as *Isospora* spp. and Oxyurids predominated, what is characteristic for reptiles kept in captivity. The number of excreted oocysts and eggs was significant, reflecting the high intensity of infection. Similar results were obtained by other authors using different diagnostic methods, what can be explained by the limited living space in a terrarium resulting in environmental contamination with parasitic elements [1,2–8].

Table 1. Prevalence (%) of internal parasites found in coproscopical examination of reptile faeces

Reptile species	Parasites	n	[%]	No. of negative
Bearded dragon <i>Pogona vitticeps</i> n=49	<i>Isospora</i> spp.	18	36.7	17(34.7%)
	<i>Eimeria</i> spp.	2	4	
	<i>Oxyuris</i> spp.	28	57.1	
	<i>Strongylus</i> spp.	2	4	
Chinese water dragon <i>Physignathus concinus</i> n=2	<i>Oxyuris</i> spp.	1	50	1(50%)
Veiled chameleon <i>Chamaeleo calytratus</i> n=4	<i>Isospora</i> spp.	4	100	0
	<i>Oxyuris</i> spp.	3	75	
	<i>Giardia intestinalis</i>	1	25	
Leopard geckos <i>Eublepharis macularius</i> n=21	<i>Isospora</i> spp.	7	33.3	7(33.3%)
	<i>Oxyuris</i> spp.	14	66.7	
Turtles (<i>Testudo horsfieldii</i>), (<i>Trachemys scripta elegans</i>) n=15	<i>Isospora</i> spp.	4	26.6	7(46.6%)
	<i>Oxyuris</i> spp.	2	13.3	
Snakes <i>Lampropeltis</i> spp. n=10	<i>Isospora</i> spp.	4	40	6(60%)
	<i>Oxyuris</i> spp.	1	10	
	<i>Hymenolepis</i> spp.	1	10	

Coccidia of the genus *Eimeria* spp. are found in the bile ducts and gallbladder of the reptiles, while *Isospora* spp. mainly in the intestines [7,10]. Coccidia and Oxyurids infection are very common in free-living reptiles, and most cases are of low or even no pathogenicity [1,7,10,11]. In generally healthy reptiles gastrointestinal epithelial regeneration is fast enough to keep the symptoms of the parasitic infection unnoticeable. In case of mass invasion enteritis occurs, which is manifested by vomiting, improperly formed faeces, general weakness and anorexia [7]. Change in the consistency of the faeces to more watery and increase of the excrements odour is characteristic to inflammation in the gastrointestinal tract, as well as the appearance of larger fragments of undigested food, despite optimal temperature in the terrarium. Greiner [8] indicates, that *Isospora amphiboluri* infection hinder growth in young bearded dragons kept in captivity. Parasitic infections are especially dangerous during the winter hibernation period and shortly after. Prolonged anorexia, poor fertility and cases of intestinal impaction are observed in affected reptiles.

Ascaridia spp. and *Strongylus* spp. infections result in nonspecific gastrointestinal signs such as haemorrhagic ulcers and maldigestion, that may lead to general debility. Parasitic diseases combined with stress and poor husbandry conditions (e.g. malnutrition or low temperature in the terrarium) may even lead to death of the reptile.

In faeces of carnivorous snakes sometimes the eggs of *Hymenolepis* spp. tapeworms are observed. The eggs come from the eaten rodents and are treated as pseudoparasites. It is recommended to repeat the faecal examination after a few days to rule out infection of the snake. If the eggs or proglottides are still present in the faeces a proper treatment should be taken.

Conclusions

Exotic reptiles held by people in their homes are often infected with internal parasites. In the case of

Giardia intestinalis the potential risk of contracting pet owners exists. Hence, it is advisable to monitor the reptile parasitoses in animals kept by individual owners and in pet stores. It would contribute to improving the safety and welfare of these animals.

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