MORPHOLOGICAL STUDIES ON SOME PARASITES INFECTING HEDGEHOGS (HEMIECHINUS AURITUS) IN EGYPT

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Abstract

Morphological studies were carried out on 8 hedgehogs captured from desert areas. They were parasitologically examined. External examination revealed no infection with external parasites. After sacrifice, microscopical examination of blood and organ smears were refractory to any blood parasite. Examination of the mesentry and intestines revealed different species of parasites. Five hedgehogs were found infected with the acanthocephala Prosthennarchis elegans and Moniliformis moniliformis. One animal carried the nematode Gongylonema spp. larve; each one was enclosed in a cyst. Two hedgehogs had an infection with the nematode Rictularia spp. All recovered parasites were thoroughly identified and illustrated, some of them were discussed from the zoonotic point of view.

INTRODUCTION

The order insectivora includes a number of species among which are hedgehogs, that are popular with the hobbyists as exotic pets, because of their small size and interesting feeding habits. Likewise, hedgehogs are useful laboratory animals. These animals are nocturnal in habit and feed on insects and small vertebrates (Wallach and Boever, 1983). Insects, such as beetles or cockroaches, may act as intermediate hosts for various species of parasites (Genov and Bily, 1980). Thus, hedgehogs, in turn, when feeding on such insects may be sources for any parasite that those insects can harbour its larval stage (Okonjo and Osajue, 1990).

Detailed studies concerning parasites infesting hedgehogs are scarce. Therefore, the present study was devoted to give a spot light on such parasites.
MATERIALS AND METHODS

Eight alive hedgehogs (Hemiechinus auritus) were captured from desert areas at El-Hamam in Mursa Matrouh and Abou-Raiwash in Giza governorates on different occasions. They were externally examined, then, sacrificed and post-mortem examination was carried out.

Blood films were prepared and stained with Giemsa stain and examined for any blood parasite. The internal organs such as the liver, the spleen, the heart and the lungs were sectioned in physiological saline and examined under a binocular dissection microscope. Impression smears from the spleen were stained with Giemsa. The mesentery, intestines and stomach were dissected and cut-opened in saline. The intestines were divided to duodenum, ileum and jejunum. Their contents were collected, washed and examined under a binocular dissecting microscope. The wall of the intestines, stomach and the mesentery was examined for the presence of any cyst. In case of presence of any worm, it was thoroughly washed with saline, identified, measured and then freshly illustrated. The uterus of the female worms was teased out and the released eggs were measured and described. Some worms were mounted and stained with carmine (Desowitz, 1980). The recovered worms were identified according to Baylis (1925) and Yamaguti (1961 and 1993).

RESULTS

Examination of the eight hedgehogs revealed no infection with any external parasite. After sacrifice, blood and organ smears were also refractory for any blood parasite. The mesentery, small and large intestines were occupied with different species of parasites. Five hedgehogs were found infected with 2 species of Acanthocephala. The first one was Prothenerchis elegans, genus, Prothenerchis, sub-family, Prothenerchiinae, family, Oligacanthorhynchidae and order, Gigantorchyidae. The second one was Moniliformis moniliformis, genus, Moniliformis, family, Moniliformidae and order, Gigantorchyidae. Three hedgehogs were found infected with 2 species of nematodes. One animal carried Gongylonema spp. larvae, genus, Gongylonema, sub-family, Gongylonomathinae, family, Spiruridae and order, Spiruridae. Each larva was enclosed in a hyaline cyst; some cysts were scattered all over the mesentery. The two other hedgehogs had an infection with Rictularia sp. Genus, Rictularia, Family, Rictulariidae and order, Spiruridae.

Prothenerchis elegans worms were detected in the jejunum which was very congested (Fig 1). The proboscis and anterior part of the neck were enclosed in a
thick capsule. The female worm measured 2.5 cm long, cylindrical, curved ventrally and transversely segmented. A clear somewhat long neck was noticed. The globular proboscis was armed with 5 transverse rows of stout hooks, the roots of which were protruded anteriorly. The proboscis receptacle seemed to be short. Lemnisci appeared long and slender. The posterior extremity of the female worm showed a vagina terminating about 125 μm from the posterior end. The uterus, characterized by a bell, showed 2 very prominent lateral diverticula (Fig 2). When the uterus was teased out in saline solution, the eggs were released, each one measured 82-83 X 44-52 μm, barrel-shaped, thick-shelled with a developing embryo (the acanthor) showing hooks (Fig 3). The shell consisted of 3 layers, the middle one only appeared to be not complete at both poles. In front of the future head of the acanthor, there appeared a crescentic-shaped cap indicating the site of hatching.

The second species of Acanthocephala, M. moniliformis, was found located in the first part of the duodenum surrounded by fibrous tissue. The duodenum was congested. After being recovered, the worm was creamy-white in colour, measuring 8.5-9 cm long, provided with external pseudosegmentations. The retractor proboscis was claviform, armed with numerous small hooks arranged in 12 spiral rows. Each hook was provided with a backwardly directed root (Fig 4a). The proboscis receptacle was comparatively short and covered with spiral muscles. Near the receptacle base, there were 4 ganglia. The lemisci were filiform and long (Fig 4b). The posterior end of the female worm showed a sac-like uterus full of eggs and the vagina (Fig 4c). When the uterus was teased out in saline, the eggs were released. Each egg, enclosing the acanthor, was oval in shape with concentric membranes, but without strong shell. The egg measured 75 x 32 μm (Fig 4d).

Regarding nematodes, adult worms, Rictularia spp. were detected in small and large intestines. Each worm carried two rows of 32 pairs of subventral different shaped spines; there were comb-like spines each of which measured 99 x 42.9 μm and occupied the anterior third of the body (Fig. 5a), while, in the middle and posterior thirds there appeared individual spines directed backwards and measured 49.5 x 9.9 μm. There was a cuticular transparent sheath enclosing these spines (Fig 5b). The mouth being subterminal, opened by a transverse elongated aperture bordered by 2 pairs of denticles, the buccal capsule was well chitinized and armed at its base with a pair of prominent teeth. The oesophagus was simple, slightly claviform and measured 1.57 mm long. There were two cervical alae extending from the mouth region till the middle of anterior third of oesophagus (Fig. 6). The male was 4.25 mm long terminating with a conical thumb-like tail and provided with a
small ala. There were 2 V-shaped short unequal spicules, each of which was supported by a gubernaculum. Anterior to these spicules, there were 4 prominent protrusable oval sensitive papillae. There was a single tubular testis (Fig. 7). Concerning the female, it measured 10-11 mm long and 250 μm wide. The tail was conical and pointed (Fig 8a). The vulva was located at 2-4 mm from the anterior end and has a conspicuous projecting appendage (Fig 8b). When the uterus was teased out in saline solution, the eggs were released. Each egg was oval, thin-shelled, occupied by one cell embryo and measured 35.2 x 24.2 μm (Fig. 8c).

By examination of the mesentery, small pin-headed hyaline cysts were observed. When compressing one of them, a larval stage of a nematode was released (Fig. 9a). This was recovered and microscopically identified as a larval stage of Gongylonema spp. It measured 4.5 mm long. Its entire body was marked by transverse striations. There were fine tubercles characteristic of the species arranged in longitudinal rows. Figure 9b showed that the mouth was surrounded by a funnel-shaped cuticular rim. There were 2 pairs of minute cephalic papillae. At a very short distance from the mouth, there was a pair of structures termed semilunar depressions. Figure 9c showed that the mouth led to a narrow short pharynx, followed by a relatively short and narrow anterior muscular portion of the oesophagus. This portion was surrounded, near its posterior end by a nerve ring at a distance of 0.2 mm from the anterior extremity. The posterior portion of the oesophagus was much longer than the anterior one. At a distance from the anterior extremity of the worm, there was a lateral cervical papilla, and a cervical ala was present. Figure 9d showed that the excretory pore was situated near the posterior end of the oesophagus. Regarding the posterior end of the future female, there was a slightly prominent vulva situated at 187.5 μm from the posterior end (Fig. 9e). Figure 9f showed a spherical swelling which may be the peduncle of one or more papilla of the future male.

DISCUSSION

The present study revealed the presence of different parasites inhabiting hedgehogs; two of them were related to Acanthocephala and the other two to nematodes. Acanthocephala were P. elegans and M. moniliformis. They were identical to those described by Yamaguti (1983). Roual (1993) found the proboscis and the anterior part of the neck of Acanthocephala encased in a capsule of proliferative connective tissue in spleen and gut wall of Pisces. This was similar to that found in this study, where, the proboscis of Prothenerorchis was surrounded by a capsule;
many capsules were found scattered all over the jejunum. Flynn (1973) stated that
P. elegans is the highly pathogenic intestinal parasites of the American monkeys
because cockroaches, the intermediate host, is common in primate cages. In Egypt,
Omar and Bakr (1993) described M. moniliformis isolated from hedgehogs. Also,
Oetinger (1995) removed the same Acanthocephalan from the greater omentum of a
rat, where the worm was encased in a host connective tissue tunnel. This was
similar to that found in this study as M. moniliformis was found surrounded by
fibrous tissue in the duodenum. Neafie and Marty (1993) recorded a human case of
M. moniliformis. Thus, M. moniliformis, from the zoonotic point of view, can be
transmitted from hedgehogs to man, a fact which must be looked for.

Regarding Gongylonema spp., larva, it was identified after Baylis (1925). The
adult worm inhabits the oesophagus of mammals such as sheep, goat, cattle and also
man. The larva of this parasite had been found by Alicata (1935) embedded in the
wall of gastroesophageal region of a guinea-pig. He suggested that the larve excyst
in the stomach and then migrate anteriorly to the wall of oesophagus. Such case is
that which has been detected in the mesentry in this study as Gongylonema spp.
Larvae were found in hyaline cysts scattered all over the mesentry. Concerning the
spherical swelling found in the posterior extremity of the future male, Seurat
(1916) observed a similar enormous swelling, and stated that it was the peduncle of
one or more of the papillae. The importance of Gongylonema lies in the fact that it
is a zoonotic parasite, so, hedgehogs can be a source of transmitting this parasite to
man. The presence of this parasite in human beings may interfere with the
dilution process (El-Rafaii and Michael 1991).

The other nematode, Rictularia spp. was identified after Yamaguti (1961).
From the available literature, this parasite had been discovered by Wilh-Suhm
(1869) in fox and hedgehogs in Egypt. Up till now, it is not sure whether this
parasite could be transmitted to man. Semenova (1971) described Rictularia
volgensis found in the intestine of hamsers. It was 2.912 mm long with unequal
spicules, the number of cuticular combs were 40 per row and the pre-anal cuticular
projections were 6, the oral capsule was armed with 6 dentides and 3 large
bicuspide teeth.

From the previous results it is concluded that, due to the natural habit of
hedgehogs to prey insects, they can be liable to be inhabited by variable species of
parasites. Thus, hedgehogs could be a source of infecting other hosts with parasites
even man who sometimes prefer keeping hedgehogs in houses, consequently, they
facilitate the dissemination of a particular parasite.
REFERENCES


EXPLANATION OF FIGURES

Fig. 1: Anterior part of *P. elegans* after mounting (p. proboscis, Pr. proboscis receptacle, L. lemniscus) x 50.

Fig. 2: Posterior part of *P. elegans* after mounting (U. uterine bell, Dv. Diverticula, V. vagina) x 50.

Fig. 3: Fresh *P. elegans* eggs x 500.

Fig. 4: (a and b) Anterior part of *M. moniliformis* after preservation (P. proboscis, Pr. Proboscis receptacle, L. lemniscus, G. ganglia) 4a x 125 and 4b x 50.

(c) Prosthetic part of *M. moniliformis* after preservation (U. uterus, V. vagina) x 50.

(d) Fresh *M. moniliformis* egg x 500.

Fig. 5 (a and b) Rictularia spp. spine x 500.

Fig. 6: Fresh anterior part of Rictularia spp. (D. denticle, T. tooth Ca. Cervical alia, Oe. oesophagus) x 500.

Fig. 7: Fresh posterior part of Rictularia spp. male (Se. sensitive papillae, Gu. gubernaculum, Sp. spicule. A. ala) x 125.

Fig. 8: (a) Fresh posterior part of Rictularia spp. female x 125.

(b) Vulva of female *Rictularia* showing a projecting appendage x 125.

(c) Fresh eggs of *Rictularia* spp. x 500.

Fig. 9: (a) Fresh *Gongylonema* spp., larva (Tu. tubercles, Ts. Transverse striations) x 50.

(b, c and d) Fresh anterior end of *Gongylonema* spp. larva (Cr. Cuticular rim, Ca. Cephalic papillae, Sd. semilunar depression, Oe. Oesophagus, N. nervous ring, Cp. cervical papilla, Ca. cervical alia, E. excretory pore) 9b x 500, 9c x 125 and 9d x 50.

(e) Fresh posterior end of female *Gongylonema* spp. x 125.

(f) Fresh posterior end of male *Gongylonema* spp. x 500.
دراسات وصفية عن بعض الطفيليات التي تسبب القنافذ بمصر

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تم إجراء هذه الدراسة على ثمانية قنافذ حية تم صيدها من مناطق صحراوية مختلفة. أجريت دراسات طفيلية على هذه القنافذ. بالخصوص النظري بين عدم إصابة هذه الحيوانات بالطفيليات الخارجية. تم تجذب هذه القنافذ وأخذ منها مياه من وسناح من الأعضاء الداخلية المختلطة. بعد الفحص كانت جميعها سليمة للطفيليات الدموية.

عند فحص الأمعاء والفصاء الريثوتي تبين أصايتها بأنواع مختلفة من الطفيليات. خمسة قنافذ كانت مصابا بثروشكس إيجادس ومولفيفورس ومانوفر دبيب مل.

واحد كان مصابا قرشات جونجولونيا كما ثبتت إصابة قنافذين بطفيل ديكتيولاريا. تم توصيف هذه الطفيليات بالتفصيل مع تصويرها ومناقشة أهمية بعضها من ناحية الصحة العامة.