

High clinical disturbance and mortality in pigeon flocks caused by *Hadjelia truncata* infection in Sistan, Iran

Reza NABAVI^{1*}, Javad KHEDRI², Mehdi JAHANTIGH³

¹Department of Pathobiology, Faculty of Veterinary Medicine, University of Zabol, Zabol, Iran

²Department of Pathobiology, School of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

³Department of Clinical Science, Faculty of Veterinary Medicine, University of Zabol, Zabol, Iran

Received: 16.12.2011 • Accepted: 26.04.2012 • Published Online: 03.06.2013 • Printed: 27.06.2013

Abstract: A large number of birds in 3 pigeon flocks (containing 637 individuals) were severely affected by *Hadjelia truncata*. This was observed in April 2011 in Sistan District in Iran. In the affected birds, progressive weight loss, weakness, and death were observed. In the necropsy of 8 cases the gizzards were larger and softer than normal and in all of them distortion was detected. Stool examination by the Clayton Lane method revealed 72% infection among domestic pigeons. The hematological analysis of affected birds showed signs of decline in hematocrit and total protein volume. A levamisole treatment program could successfully remove the parasite from pigeon flocks.

Key words: *Hadjelia truncata*, pigeon, Sistan, Iran

1. Introduction

Hadjelia truncata (Creplin, 1825) belongs to the family Habronematidae, superfamily Habronematoidea, order Spirurida (1), and affects different groups of birds such as Coraciiformes, Columbiformes, and rarely Galliformes (2). The adult parasite (males 6–7 mm and female 17–19 mm) resides in the gizzard of the bird. The eggs, including first stage larvae (oval shape with length of 54–57 µm and width of 30–32 µm), are present in the feces, and various kinds of beetles, mainly *Alphitobius diaperinus*, have been identified as intermediate hosts (2,3).

Clinical symptoms such as weight loss, diarrhea, weakness, and death were observed in infected pigeons (3,4).

The existence of the parasite throughout the country has been reported by Iranian researchers (5,6), but such a high prevalence status, with high clinical disturbance and mortality, has not been seen before.

2. Case history

2.1. Clinical findings

The owners of 3 pigeon (*Columbia livia*) flocks containing 637 birds complained of a gastrointestinal disease manifested by progressive weight loss, white diarrhea, weakness, and 9.58% (61 cases) mortality (Figure 1A). Blind antibiotic therapies were administered to treat the sick birds, but no advantage was observed.

2.2. Necropsy findings

Five of the affected birds were euthanized and, in addition, 3 new dead bird carcasses were chosen for postmortem inspection. The carcasses of the birds were opened according to standard techniques for necropsies of chickens; the viscera and trachea were removed and opened for macroscopically examination. In all cases, the gizzard was larger and softer than normal and in all of them distortion was observed. A large number of nematodes (the mean worm burden was 127 worms per case) were detected beneath the lining of the affected gizzards (Figure 1B, Figure 1C). Low infestation with intestinal cestodes was identified in all. Infection with other nematode species was not seen.

2.3. Parasitological investigation

The worms were collected from the lining of the gizzards and washed by shaking in 0.9% saline and kept in 70% ethanol + 5% glycerin. A number of worms were cleared in lactophenol for identification using a light microscope (7). The lengths of the male and female were 8–11 mm and 16–23 mm, respectively.

Microscopic examination of the cephalic region revealed 2 lateral lips with winged appearance, each being trilobed with a cylindrical pharynx (Figure 2A). The egg was oval, including the first stage larva (Figure 2B). Two obvious unequal spicules (one 1410–1470 µm long and

* Correspondence: rezanabavi@uoz.ac.ir

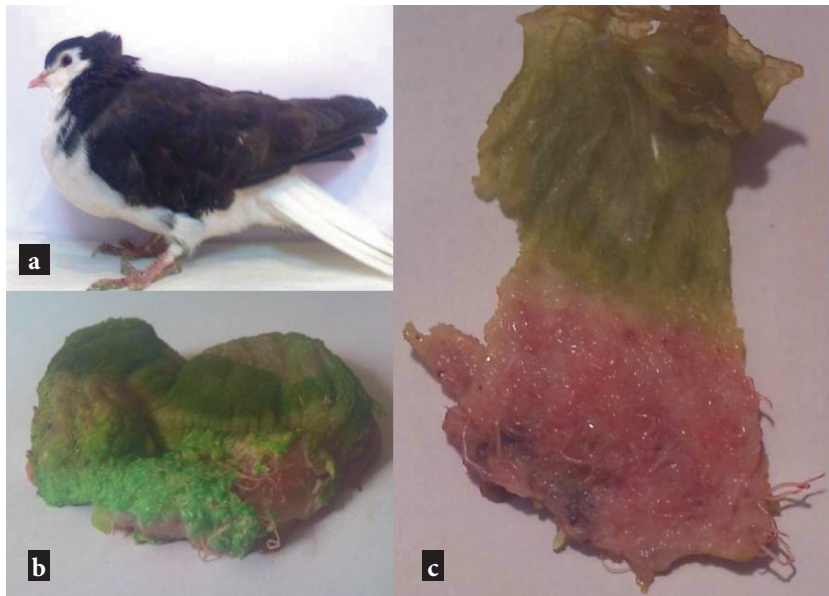


Figure 1. a) A weak emaciated pigeon affected by *Hadjelia truncata*. b) Heavily infected gizzard before removal of the lining. c) The large number of nematodes attached beneath the lining of the gizzard.

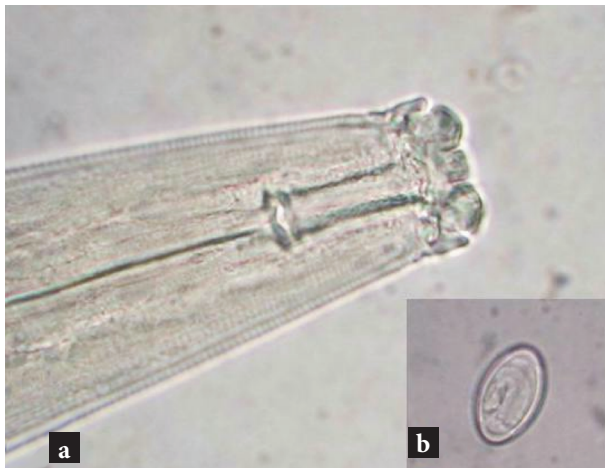


Figure 2. a) Anterior end of *Hadjelia truncata*; 2 lateral lips, each being trilobed with a cylindrical pharynx, are detectable. b) Oval egg with length of 54–59 μm and width of 30–32 μm , including first stage larva.

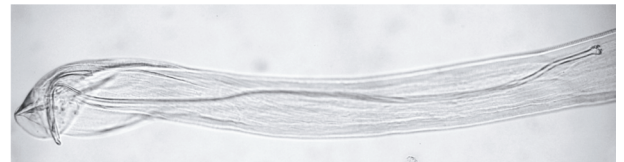


Figure 3. Posterior end of male *Hadjelia truncata*. Two obvious unequal spicules (one 1410–1470 μm long and the other 320–350 μm long) with 2 wide caudal alae.

another 320–350 μm long) with coiled tail revealed the spirurid type of nematode (2) (Figure 3). Two wide caudal alae with 5 pairs of papillae were detected in the adult males.

In order to estimate the prevalence of infection in the mentioned flocks, a stool examination was performed on 100 fresh specimens using the Clayton Lane (centrifugal flotation) method looking for eggs by the following

procedure. One gram of a fecal sample is mixed well with water (about 30–50 mL) and strained through a sieve (1 mm mesh) to remove coarse fecal material. The mixture is sedimented for 10 min on the bench, until the supernatant is clear. The sediment is then mixed with a saturated solution of sugar in a centrifuge tube (15 mL volume using a coverslip that touched the surface) and centrifuged for 2 min at 500 $\times g$. The eggs will float and can be recognized (7).

2.4. Hematological analysis

Five contemporary pigeons from each infected and noninfected group were selected via the stool examination results. Blood sampling was conducted via wing venipuncture, using 23-gauge sterile hypodermic needles and syringes. About 1 mL of blood was collected from each bird. Blood for hematological parameters was collected in bottles, containing ethylenediaminetetraacetic acid (EDTA). The packed cell volume values and the total protein (TP) concentration were determined by

the microhematocrit and the refractometric methods, respectively (8).

2.5. Posttreatment findings

In all pigeons, the treatment was performed by adding 15 mL of diluted levamisole solution to 1 L of drinking water. Each milliliter of diluted solution contained 37.5 mg of levamisole hydrochloride. After 10–15 days the absence of all clinical disturbances was reported. Consequently, the elimination of *Hadjelia truncata* eggs from stool specimens was detected.

3. Results and discussion

Hadjelia truncata has been recognized from different kinds of birds all over the world, especially in Asia, Europe, and Africa (5,6,9,10) and some scientists have observed different kinds of clinical disturbance in pigeons that have been infected with this parasite (4,5,9). Unfortunately, there is not enough information about this parasite in the poultry disease and veterinary parasitology literature. This is probably related to the mildness of *Hadjelia truncata* infection around the world; it is not considered a health-threatening parasitological infection for pigeon flocks. In the present study, we describe a huge number of *Hadjelia truncata* affecting a large number of pigeons in the Sistan District of Iran. In 72% of specimens the Clayton Lane method showed the eggs (oval with length of 54–59 µm and width of 30–32 µm) including the first stage larva (Figure 2B). This phenomenon has been reported only in Cyprus and Saudi Arabia (4,9). However, Iranian researchers have previously reported this parasite in Iranian pigeons from other parts of the country (5,6) but this observation with high severity is unique to Iran so far. In addition to the mentioned flocks, we encountered other

owners complaining of a similar disease that affected their domestic pigeons in the area.

The results of the present study showed that the collected nematodes were (1–2 mm in males and 3–5 mm in females) longer than such species described before by Razmi et al. (2007). Length variability in Habronematidae nematodes has been described before (2,11) but it could be advantageous to conduct further supplementary studies in order to describe different types of parasite around the country.

During the identification of the parasite it was decided to analyze packed cell volume (PCV) and TP values of both affected and healthy birds. Unfortunately, the owners did not agree to further blood sampling and only 5 specimens from each group were examined. The analysis showed mean PCV values of 42.40% and 48.81% in affected and healthy birds, respectively. Moreover, the mean value of plasma TP was 3.32 g dL⁻¹ and 5.12 g dL⁻¹ in affected and healthy pigeons, respectively.

The results showed reductions in both PCV and TP values in affected birds when compared with the healthy group. However, the PCV/TP values were within normal ranges (12), i.e. 42%–50% and 3–6 g dL⁻¹, in both groups, respectively. Reduction in these hematological parameters has been reported during different disease periods (13). A close correlation between severe clinical disturbance of the birds and decline in PCV/TP was anticipated, but, in order to have more reliability, more blood samples are needed for statistical analysis. It seems that maldigestion and, consequently, malabsorption due to heavy infection with *Hadjelia truncata* are the main proof of clinical and hematological disturbance. Finally, it could be concluded that infection with *Hadjelia truncata* is an important health threat for domestic pigeons in the Sistan District of Iran.

References

- Anderson, R.C.: Nematode parasites of vertebrates their development and transmission. 2nd ed. CABI Publishing, Wallingford, UK. 2000; 432–433.
- Junker, K., Boomker, J.: Helminths of guineafowls in Limpopo province, South Africa. Onderstepoort. J. Vet., 2007; 74: 265–280.
- Geyhan, M.E.: Role played by some arthropods in transmission of some parasitic diseases to birds in Assiut Governorate. Ass. Univ. Cent. Envir. Studies, 2004; 2: 4–5.
- Appleby, E.C., Gibbons, S.L.M., Georjoui, K.: Distortion of the gizzard in Cyprus pigeons (*Columba livia*) associated with *Hadjelia truncata* infestation. Vet. Rec., 1995; 136: 561–564.
- Razmi, G.R., Kalidari, G.A., Maleki, M.: First report of the *Hadjelia truncata* infestation in pigeons of Iran. Iran. J. Vet. Res. Univ. Shiraz, 2007; 19: 175–177.
- Radfar, M.H., Fathi, S., Norouzi, E., Mirzaii, M., Rezaei, H.: A survey of parasites of domestic pigeons (*Columba livia domestica*) in South Khorasan, Iran. Vet. Res., 2011; 4: 18–23.
- Soulsby, E.J.L.: Helminths, Arthropods and Protozoa of Domesticated Animals. 7th ed. Bailliere Tindall, London. 1982; 763–766.
- Benjamin, M.M.: Outline of Veterinary Pathology. 3rd ed. Kalyani Publishers, New Delhi. 1985; 214–285.
- Al-Attar, M.A., Abdul-Aziz, T.A.: *Hadjelia truncata* in pigeons. Vet. Rec., 1985; 117: 535.
- Tadros, G., Iskander, A.R.: *Hadjelia truncata*, a new parasite of pigeons in Egypt and its pathogenicity. J. Egyptian. Vet. Med. Assoc., 1975; 35: 283–301.
- Mawson, P.M.: Habronematinae (Nematoda: Spiruridae) from Australian birds. Parasitology, 1968; 58: 745–767.
- Fudge, A.: Laboratory Medicine: Avian and Exotic Pets. WB Saunders, Philadelphia, PA, USA. 2000; 147–153.
- Vazquez, B., Esperon, F., Neves, E., Lopez, J., Ballestros, C., Monuz, M.J.: Screening for several potential pathogens in feral pigeons (*Columba livia*) in Madrid. Acta Vet. Scand., 2011; 52: 45.