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Case Report

# *Hadjelia truncata* Infection Among Quails (*Coturnix coturnix*) In Semnan City, Iran

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Running title: *Hadjelia truncata* infection among quails

## Abstract

*Hadjelia truncata* is a spiruridan nematode that can infect the digestive system of birds with an indirect life cycle. Different beetles can be intermediate hosts. Birds were infected by ingesting beetles containing infective larvae (L3). The worms can be diagnosed by light microscope and molecular techniques. The disease among birds can be asymptomatic to fatal. In this report, the infection of quails' gizzards with *H. truncata* in Iran has been described. Twenty-five referred gastrointestinal tracts of naturally dead quails were inspected. Eighteen *H. truncata* nematodes were removed from six gizzards out of twenty-five gastrointestinal samples (24%). All the removed worms were located between the submucosal and muscular layers of the infected gizzards. Because of postmortem alterations, the histopathological sections of infected gizzards could not be performed. This report is the first observation of *H. truncata* infection among quails all around the world. This worm has been previously reported among pigeons (*Columba livia domestica*) and hoopoes (*Upupa epops*).

**KEYWORDS**: Bird, Gastrointestinal worm, Gizzard, *Hadjelia*, Spirorida.

## Case History

*Hadjelia truncata* is a nematode (roundworm), order Spirurida, Family Habronematidae. Birds' digestive tracts mainly the ventriculus and gizzard are infected (Anderson, 2000; Senties-Cue *et al*., 2011; Khordadmehr *et al*., 2018). *Hadjelia truncata* has an indirect life cycle that has not been definitively identified. Eggs are shed in bird feces. When intermediate hosts such as some beetles (*Phylan abbrevivatus, Asida jurinei*, *A. sericea*, (Anderson, 2000) and *Alphitobius diaperinus* (Alborzi and Rahbar, 2012) ingest the eggs, the infective worms or the third-stage larvae (L3) are formed in the hemocoel of the beetles. If infected beetles are ingested by birds, the life cycle will be completed and adult worms are formed in the gastrointestinal tract (Alborzi and Rahbar, 2012).

Quails (*Coturnix coturnix*, Phasianidae, Galliformes) are grown in different parts of Iran. This report aimed to describe the first quail infection of *H. truncata.*

## Clinical Presentation

Twenty-five naturally dead male quails' gastrointestinal tracts were referred from a quail farm in Semnan city to the parasitology laboratory, Faculty of Veterinary Medicine, Semnan University, Iran.

## Diagnostic testing

All referred digestive tracts were inspected, and a total of eighteen *H. truncata* worms were removed and diagnosed from six gizzards. Therefore, the infection rate of *H. truncata* among referred quails was 24%. The average number of worms in each infected quail was three. All the nematodes were located between the submucosal and muscular layers of infected gizzards. The direct swabs of the fecal samples were also examined. *Hadjelia truncata* eggs were also observed in the infected quails (Figure1.). The size of the removed worms and their eggs were shown in Table 1.

Table 1. The size of removed *Hadjelia truncata* and detected eggs

| Male worm | short spicule (mean) | Long spicule (mean) | female worm | egg |
|---|---|---|---|---|
| 6-9 mm | 0.35mm | 1.44 mm | 15-18 mm | 22-28×44-47 µm |

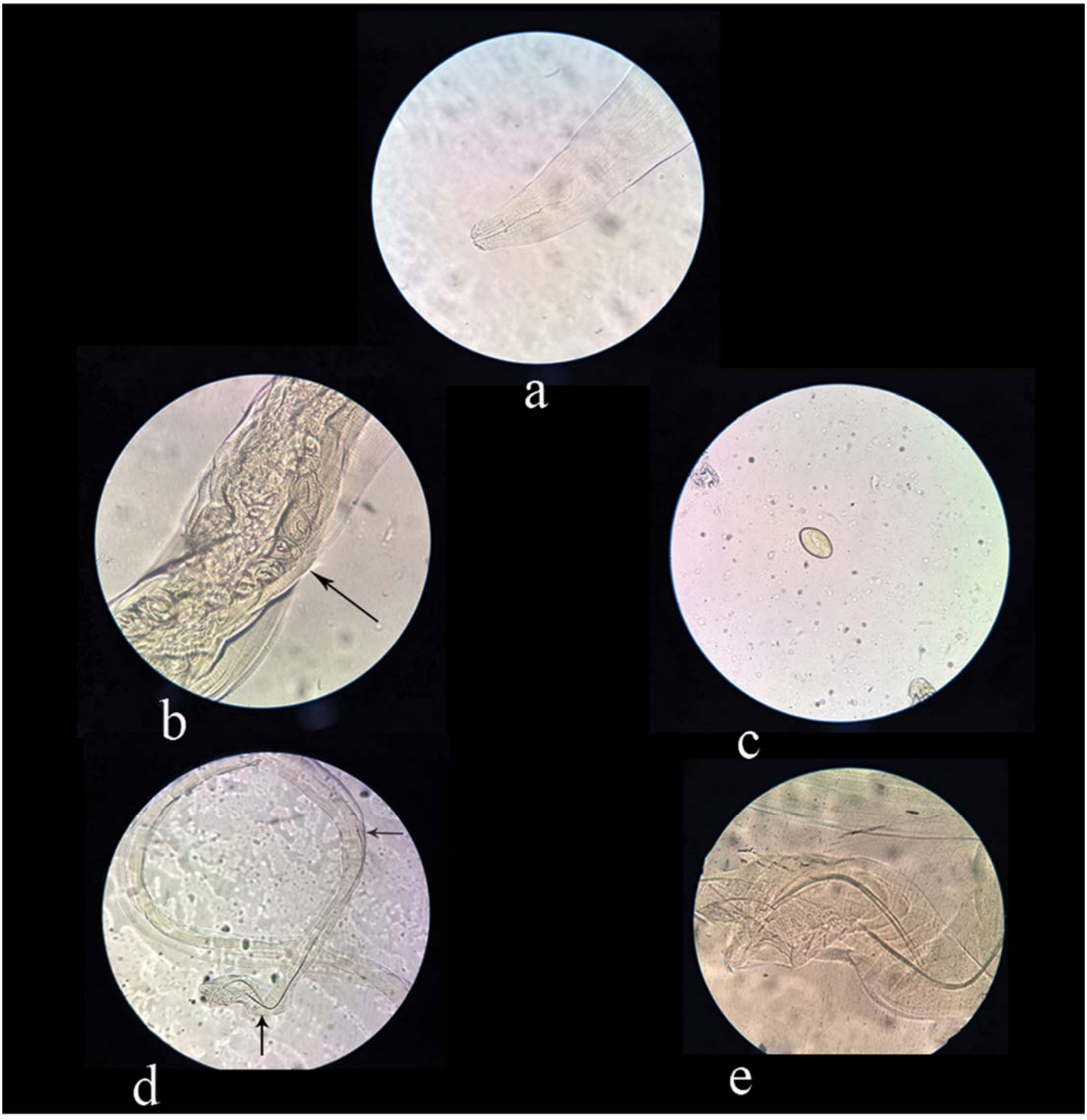
a
b
c
d
e

**Figure 1. a:** anterior part of *Hadjelia truncata*, The mouth is surrounded by two lateral lips that are trilobed and has a cylindrical pharynx, 400x, **b:** uterus containing eggs of the female *H. truncata*, black arrow, 1000x, **c:** the egg of *H. truncata* in fecal sample direct smear, containing larva, 1000X, **d:** posterior part of the male *H. truncata*, note the origin of long and short spicules (black arrows), 400x, **e:** bursa and spicule end of *H. truncata*, 1000x.

## Assessments

*Hadjelia truncata* has been reported in pigeons' (*Columba livia domestica*) gizzards in Iran (Razmi *et al*., 2007; Radfar *et al*., 2011; Alborzi and Rahbar, 2012; Nabavi *et al*., 2013; Khordadmehr *et al*., 2018), Iraq (Al-Attar and Abdul-Aziz, 1985), Egypt (Tadros and Iskander, 1975), and Cyprus (Appleby *et al*., 1995), in gizzard and ventriculus of pigeons in California, US (Senties-Cue *et al*., 2011; Ochoa and Adaska, 2021). It has also been reported in hoopoe (*Upupa epops*) in France (Anderson, 2000).

The size of male and female *H. truncata* has been recorded 7-9 mm, and 13-17 mm (Razmi *et al*., 2007), 7-11 mm, and 15-20 mm (Khordadmehr *et al*., 2016), 6.5-9 mm, and 12-16.5 mm, respectively (Senties-Cue *et al*., 2011), in this study the size of male worms was 6-9 mm and female worms was 15-18 mm. The mean size of long and short spicules was 1.26 mm, and 0.34 mm (Razmi *et al*., 2007), 1.27 mm, and 0.35 mm, respectively (Senties-Cue *et al*., 2011) in our study it was recorded 1.44 mm and 0.35 mm. The eggs size was 20-30×43-45 µm in Khordadmehr *et al*. (2016) and in this study was 22-28×44-47 µm.

The signs of infection are weight loss, weakness, loss of appetite, poor feathering, and diarrhea. However, it seems to be severe and also fatal among pigeons (Appleby *et al*., 1995; Kelly *et al*., 2013). The histopathologic alterations of previously reported cases of infected pigeons were severe inflammatory cell infiltration with necrosis of mucosal and submucosal layers of the gizzard (Khordadmehr *et al*., 2018). A PCR (polymerase chain reaction) technique for the detection of *H. truncata* DNA (deoxyribonucleic acid) has also been explained (Kelly *et al*., 2013).

This is the first report of *H. truncata* infection in quails all around the world. No obvious changes in infected gizzards were grossly observed. It might be because of the low number of worms in each gizzard. The histopathologic sections of gizzards could not be made because of postmortem alterations of referred digestive tracts.

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**Conflict of interests**

The authors declare that they have no conflict of interests.

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**گزارش موردی**

# آلودگی بلدرچین ها (*Coturnix coturnix*) به *Hadjelia truncata* در شهر سمنان، ایران

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## چکیده فارسی:

*Hadjelia truncata* یک نماتود اسپیروراید است که می تواند دستگاه گوارش پرندگان را آلوده کند و سیر تکاملی غیر مستقیم دارد. برخی سوسک ها می توانند میزبان واسط باشند. پرندگان با خوردن سوسک های آلوده به لارو مرحله 3 به این کرم آلوده می شوند. این کرم ها می توانند به وسیله میکروسکوپ نوری و روش های مولکولی تشخیص داده شوند. بیماری در پرندگان می تواند از بی علامت تا کشنده متغیر باشد. در این گزارش، آلودگی سنگدان بلدرچین ها به *H. truncata* شرح داده شده است. بیست و پنج دستگاه گوارش بلدرچین هایی که به صورت طبیعی مرده بودند مورد بازرسی پس از مرگ قرار گرفت. شش سنگدان از بیست و پنج نمونه (24٪) به کرم *H. truncata* آلوده بودند. در مجموع هجده کرم جداسازی و تشخیص داده شد. کرم ها بین لایه های زیر مخاط و عضلانی سنگدان های آلوده بودند. به دلیل تغییرات پس از مرگ، مقطع هیستوپاتولوژیک تهیه نگردید. بنابراین برای اولین بار در دنیا آلودگی بلدرچین ها به *H. truncata* گزارش می شود. آلودگی به این کرم از کبوتر (*Columba livia domestica*) و هد هد (*Upupa epops*) گزارش شده است.

**کلمات کلیدی:** *Hadjelia*، اسپیروریدا، پرنده، سنگدان، کرم دستگاه گوارش