Journal of Coastal Life Medicine

journal homepage: www.jclmm.com

Case report doi: 10.12980/jclm.4.2016j5-177

Gastrointestinal helminthes of houbara bustard (*Chlamydotis undulata*) from north of Iran

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ARTICLE INFO

Article history:
Received 14 Sep 2015
Received in revised form 26 Oct 2015
Accepted 20 Nov 2015
Available online 28 Dec 2015

Keywords:
Parasite
Houbara bustard
Chlamydotis undulata
Migratory birds
Iran

ABSTRACT

The parasitic infection of houbara bustard (*Chlamydotis undulate*) in north of Iran, Golestan Province was reported in this study. The carcass of a male houbara bustard about 2 years old with 2.5 kg body weight, was forfeited from impermissible hunters by the Department of Environment in Gorgan, Golestan Province during January 2015. The gastrointestinal tracts was dissected and examined for helminth infection. Species of Nematoda, Cestoda and Acanthocephala were found which were as following: *Hartertia obesa*, *Idiogenes otidis*, *Mediorhynchus taeniatus*, respectively from small intestine. Based on the results obtained from the present study, it can be concluded that *Chlamydotis undulata* may play an important role in the transmission of the mentioned parasites. In addition, this is the first report of *Hartertia obesa*, *Idiogenes otidis*, *Mediorhynchus taeniatus* in Iran.

1. Introduction

The houbara bustard (*Chlamydotis undulata*), male 1.5–2.5 kg and female 1.0–1.6 kg, a member of the Otididae, inhabits in dry lands. Three subspecies of houbara bustard are identified: *Chlamydotis undulata undulata* lives from North Mauritania to Egypt; *Chlamydotis undulata macqueenii* found from Sinai, Arabia, and the Caspian Sea, to Baluchistan, Afghanistan, Kazakhstan and Mongolia, and *Chlamydotis undulata fuertaventurae* lives in the Canary Isles[1,2]. The natural home is mainly Mediterranean, steppe and semi-desert areas on bosky flatlands. The Canarian and North African subspecies are sedentary and do not migrate, while the Asiatic subspecies in the autumn flight from Central Asia and spend winter in Arabia, Iran, India, Iraq and Pakistan[3]. In Iran, houbaras are distributed from the central deserts to the Persian Gulf, live in large areas of remote deserts[3]. The MacQueen's bustard was classified as vulnerable by the International Union for the Conservation of Nature[4]. The houbara is also prohibited from international trade[5]. According to our knowledge and reviewing the literature, reports for parasitic helminthes of houbaras in Iran are still unknown and need to be elucidated. Therefore, the current study was conducted to clarify parasitic helminths of houbara bustard in Iran.

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2. Case report

2.1. Study area

A male houbara bustard about 2 years old with 2.5 kg body weight, was forfeited from illegal hunters by Department of Environment in Gorgan, Golestan Province during January 2015. Gorgan (latitude 36°50'21" N, longitude 54°26'10" E) is a city in Golestan Province, on the coastal plats of the Southeast Caspian in north of Iran. The carcass was frozen and transferred to the Parasitology Laboratory in Department of Veterinary Parasitology of Islamic Azad University of Babol Branch for necropsy.

2.2. Sample collection and examination

For endoparasites, dissection was performed from the throat to

the anal opening. The body cavity was opened and the digestive tract was removed. After collecting the visible helminthes of digestive tract (stomach, small and large intestine), the contents of each organ were screened by Mesh 70 separately for acute investigation. The remnants were conveyed to Petri dishes. A stereomicroscope was used for collecting very small endoparasites probably attached to mucosal layer of the stomach and intestinal tract. The obtained Cestoda sample was preserved and fixed in 70% ethanol, stained with carminic acid procedures, dehydrated then cleared and mounted in Canada balsam (Merk). Nematoda and Acanthocephala specimens were killed in hot saline solution, fixed in a solution made with 70% ethanol and 5% glycerin, cleared by a droplet of lactophenol, mounted by Canada balsam. Identifications of helminths were performed using a stereo-microscope (Olympus, Japan) according to available systematic keys[6,7].

After necropsy, Nematoda, Cestoda and Acanthocephala as follows were founded from small intestine: *Hartertia obesa* (*H. obesa*), *Idiogenes otidis* (*I. otidis*), *Mediorhynchus taeniatus* (*M. taeniatus*), respectively. Identifications were confirmed by Parasitology Museum of University of Tehran.

2.3. H. obesa (Nematoda: Hartertiidae)

Lateral flanges are very narrow, which limit to the anterior part of the body; cervical papillae just behind lips; mouth has tow, large, trilobed, lateral lips. The cuticle of the inner surface of each lip is thickened, toothed and thrown into folds interlocking with those of the opposite side; each lip has a lateral papilla, small or rudimentary interlabial space and a pair of submedian papillae. Vestibule is short; esophagus divides into two parts, of which the anterior is short and muscular. Male: caudal alae is more or less wide, with four preanal and two postanal pairs of pedunculate papillae and a group of sessile papillae at tail tip; spicules are very unequal amd it has a gubernaculum. Female: tail is conical amd rounded; vulva is near the middle of body. This parasite is oviparous and eggs have thick double shell, distinct vitelline membrane and there is in birds and mammals (Figures 1 and 2)[8].

Figure 1. Head of *H. obesa.*

Figure 2. Tail of *H. obesa.*

2.4. I. otidis (Cestoda: Davaineidae)

In this parasite, pseudoscolex may be developed. Rostellum has hammer-shaped hooks. Accessory spines in annular patch are proximal to rostellar hooks (easy lost). Suckers are unarmed. Proglottids are distinct. Genital pores are unilateral. Testes are several. Ovary is median. Uterus is inverted U-shape. uterine organ is large and extended to uterus[8].

2.5. M. taeniatus (Acanthocephala: Gigantorhynchidae)

Body of *M. taeniatus* is in medium size, usually without pseudosegmentation. Proboscis has hooks in spiral rows on anterior portion, and spines are also in spiral rows on posterior portion; latter portion often conical, somewhat wider than former and may be folded transversely. Proboscis receptacle is claviform with single layered walls. Testes in middle or posterior region of trunk. Eggs are oval and they have concentric membranous shells. This parasite is only in birds (Figure 3)[9].

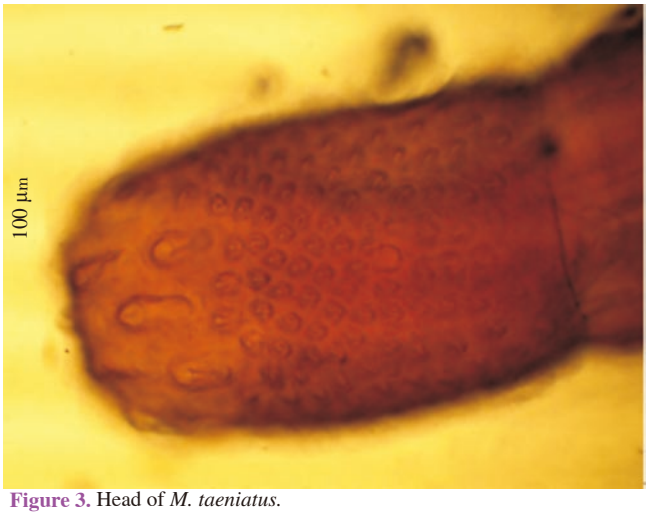

Figure 3. Head of *M. taeniatus.*

3. Discussion

Migratory birds because of passing different geographic areas, either as a final host or as a main carrier, play a significant role in the transmission of parasites. Also, migration is as an important energy

consuming activity, so resources may be discharged from immune defense and making it possible that migrants are more sensitive than residents. This case will result in migrants harboring higher variety and accession of parasites. Migration phenomenon poses the cost of exposure to diverse parasites[10]. In the current study, an investigation was conducted on a houbara bustard in Golestan Province, north of Iran resulted in the identification of *H. obesa*, *I. otidis*, *M. taeniatus*. In the United Arab Emirates, the first report of the cestode species recovered of houbara included *Hispaniolepis falsata*, *Ascometra vestita*, *Ascometra choriotidis*, *Otiditaenia conoideis*, *Otiditaenia macqueeni*, *Raillietina neyrai* and *Idiogenes* sp. The acanthocephalans *M. taeniatus* and *Centrorhynchus lancea* were also recovered from houbara bustard[11]. In a study, *Ascometra choriotidis* was first reported from the kori bustard in Kenya[12]. *Otiditaenia conoideis* has been widely reported from several bustard species in Europe and Africa[13]. *Ascometra vestita* has been recorded from houbara and rufous-crested bustards in Africa, Asia, Kazakhstan, and Urals[13]. *Hispaniolepis falsata* was first reported from the boubara bustard in Egypt[14]. In another migratory bird, *Physaloptera alata* was first reported from *Botaurus stellaris* in Iran[15]. Intestinal obstruction by massive cestode infections was reported as a cause of 4.8% of bustard deaths at the Al Ain Zoo from 1979 to 1991, and cestode infections were associated with fatal enteritis in bustards. But in a study conducted in north of Iran on another migratory bird (green-winged teal), total infection rate was 70.50%, in which 68.96% was males and 71.79% was females, respectively. There was no significant difference in the prevalence of infection between examined males and females ducks in *Hypoderaeum conoideum*, *Diorchis stefanskii* and *Notocotylus attenuatus* ($P > 0.05$) whereas a significant relationship was observed between males and females in *Contracaecum* larvae ($P < 0.05$)[16]. In similar study on a migratory bird (brown pelican), total rate of infection was 57.5%. Infection of Mexican migratory birds (ducks) with *Hypoderaeum conoideum* 14.7%, *Diorchis bulbodes* 6.2%, *Diorchis* sp. 3.9% and *Echinocotyle rosseteri* 5.4% were observed in North Central Mexico and Southwestern United States and in Florida, the prevalence rate of *Notocotylus attenuatus* was reported 8.7% examining 184 migratory birds (blue-winged teal). Enteric cestodes cause depression, anemia, blood stained feces, hemorrhagic enteritis, debility, diarrhea, weakness, and anorexia in birds[17]. Cestodes have been responsible for the mortality in small passerines and cestodal infections are associated with high mortality rate regularly found in small passerines. Acanthocephalans were the causative agents for the deaths of two crane chicks. Both birds died with peritonitis and ascites resulting from intestinal perforation, and one bird had a concurrent pneumonia. By comparing the helminthes diversity from houbara obtained in this study with those recovered from other migratory birds, it can be concluded that variations existed in helminthes populations. Moreover, migratory routes should not be over looked because of its possible impact on parasite species of birds. This is a noteworthy point to mention that this study presented the first report of *H. obesa*, *I. otidis*, *M. taeniatus* in Iran. Considering the results of the current investigation, further helminthological investigations are needed to achieve more information on helminthes diversity of migratory birds in Iran and all over the world, particularly in migratory seasons of year in order to determine the taxonomic structure and seasonal parasites diversity of the helminthes and clarify their persumed role in transmission of parasites.

Conflict of interest statement

We declare that we have no conflict of interest.

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