Comp Clin Pathol (2017) 26:165–167
DOI 10.1007/s00580-016-2361-7

ORIGINAL ARTICLE

Prevalence and intensity of parasitic infection in domestic ducks (*Anas platyrhynchas*) in Gilan Province, Northern Iran

Bahar Shemshadi[1] · **Shahrokh Ranjbar-bahadori**[1] · **Mohamad Delfan-abazari**[2]

Received: 8 June 2016 / Accepted: 19 October 2016 / Published online: 27 October 2016

Abstract This study was carried out to assess the levels of parasitic infection in domestic ducks (*Anas platyrhynchas*) in Gilan Province, Northern Iran. During the summer of 2015, samples were collected randomly from local markets at different villages in Gilan Province. Blood samples were collected in EDTA-treated tubes, blood smear slides created, stained with giemsa and examined for the presence of blood protozoa. Ectoparasites samples were collected and identified according to Wall and Shearer (2001). To assess endoparasitic infection, the ducks' gastrointestinal tracts were removed and the various parts identified and opened. Parasites were collected, fixed in methanol, cleared with lactophenol and stained with borax carmine. Collected parasites were identified according to the descriptions given by Soulsby (1982) and Yamaguti (1958a, b). 56.6 % of ducks were infected with protozoan parasites, with the most prevalent of which being *Tricomonas gallinae* (prevalence 23.3 %, intensity 18 ± 2.5) followed by *Cryptosporidium bailey* (prevalence 16.6 %, intensity 15.44 ± 16.5) and *Eimeria* oocyst (prevalence 16.6 %, intensity 17.56 ± 12.5). Also found on the feathers and body surface were two species of lice (*Menocanthus stranineus* and *Liperus squalidus*), one species of tick (*Argas persicus*) and one of flea (*Ctenocephalides canis*). Prevalence and intensity of the parasite infestation varied from species to species: *M. stranineus* (prevalence 100 %, intensity 43.33 ± 17.5), *L. squalidus* (prevalence 100 %, intensity 39.20 ± 12.42), *A. persicus* (prevalence 75 %, intensity 35.24 ± 12.7) and *C. canis* (prevalence 60 %, intensity 30.16 ± 15.5). Helminthes parasite infection rate was 50 % in collected samples which consisted of *Railletina tetragona* (prevalence 26.6 %, intensity 19.34 ± 16.5), *Heterakis gallinarum* (prevalence 13.33 %, intensity 14.65 ± 12.5) and *Capillaria* (prevalence 10 %, intensity 12.56 ± 16.5). This study shows the prevalence of parasitic infection in domesticated ducks in Gilan Province, Iran. Findings indicate that applying protocols of management and applying preventative methods and treatment of infected cases are necessary to restrict parasitic infections in domestic ducks and other birds in this region.

Keywords Duck · *Anas platyrhynchas* · Parasitic infection · Iran

Introduction

In northern Iran, one of the favourite birds used as food is the domestic duck (*Anas platyrhynchas*). It is very delicious, expensive and regarded as a luxury food and as a result plays an important role in the rural economy. The domestic duck is divided into many breeds; the most common in Northern Iran is the Rouen, a heavy-weight breed which originated in France before the nineteenth century and has since spread to all parts of the world. One of the major problems in *A. platyrhynchas* is parasitic infestation, which can cause diseases in ducks and affect their productivity and growth (Farzana et al., 2008). The common ectoparasites of *A. platyrhynchas* are lice, mites and ticks that cause production losses because of the irritation and some suck blood which can cause anaemia (Graham, 1986).

Also, it has also been shown that endo- and ectoparasitic infections cause economic loss, weight loss, lowered egg production, decreased feed conversion ratio and death of young ducks (Soulsby, 1982). There is insufficient research into

✉ Bahar Shemshadi
bshemshadi@yahoo.com

[1] Department of Parasitology, Faculty of Veterinary Medicine, Islamic Azad University, Garmsar Branch, Garmsar, Iran

[2] Islamic Azad University, Garmsar Branch, Garmsar, Iran

Table 1 Prevalence and intensity of protozoan parasites in *Anas platyrhynchas*

Name of parasite	No. of host infected		Total	Prevalence, %	Intensity
	Male	Female			
Trichomonas gallinae	5	2	7	23.3	18 ± 2.5
Cryptosporidium bailey	3	2	5	16.6	15.44 ± 16.5
Oocyst of *Eimeria*	2	3	5	16.6	17.56 ± 12.5

parasitic infection of *A. platyrhynchas* in this region, and this study was carried out to assess the levels and variety of infections present.

Material and method

This study was carried out during the summer of 2015. Thirty samples of *A. platyrhynchas* were selected randomly from local markets and villages in Gilan Province, Iran.

Blood samples were collected and thin smears made immediately after collection. The smear was stained with Giemsa (Cable, 1957) and the slides examined for the presence of blood-borne protozoa. Protozoa were recognized according to the keys and descriptions given by Levine (1985), Springer (1997) and Soulsby (1982).

For collection of ectoparasites, an aerosol of 1 % malathion was used on the feathers of the body and left for 5 min. The duck was then shaken over a sheet of white paper and any ectoparasites that fell off were transferred into a vial containing 70 % methanol. Specimens were cleaned with lactophenol and identified using Wall and Shearer keys.

For collection of endoparasites, the gastrointestinal tract was removed and differentiated into the oesophagus, crop, proventriculus, gizzard, duodenum, small intestine, caecum and rectum, and then they were opened and parasites were collected, fixed and kept in 70 % methanol. The endoparasites were stained in borax carmine being cleared with lactophenol. Collected parasites were identified according to Yamaguti (1958a, b) and Soulsby (1982).

Results

In this study, 30 domestic ducks (*A. platyrhynchas*) from different parts of Gilan Province, Northern Iran, were collected randomly and examined. Based on the finding of this study, 56.6 % of ducks were infected with protozoan parasites, as shown in Table 1.

Table 2 Prevalence and intensity of ectoparasitic infestation in *Anas platyrhynchas*

Name of parasite	No. of host infected		Total	Prevalence, %	Intensity
	Male	Female			
Menocanthus stranineus	15	15	30	100	43.33 ± 17.5
Liperus squalidus	15	15	30	100	39.20 ± 12.42
Argas persicus	10	12	22	75	35.24 ± 12.7
Ctenocephalides canis	8	10	18	60	30.16 ± 15.5

This study also found two species of lice (*Menocanthus stranineus* and *Liperus squalidus)*, one species of tick (*Argas persicus*) and one of flea (*Ctenocephalides canis*) on the domestic ducks' feathers and body surface. Prevalence and intensity of the parasite infestation varied between species as shown in Table 2.

Helminthes parasite infection rate was 50 % in collected samples. Prevalence and intensity of the parasite infestation varied between species as shown in Table 3.

Discussion

The current study was carried out to assess the levels of parasitic infection in 30 domestic ducks (*A. platyrhynchas*) in Gilan Province, Northern Iran. It was shown 56.6 % of ducks were infected with protozoan parasites. However, in a previous study by Shemshadi et al. (2014) on parasitic protozoan infection of wild waterfowl in southern coastal Caspian Sea lagoons results showed that 184 birds of 293 (62.8 %) harboured protozoan parasites which was higher than the current study. The highest prevalence of protozoan contamination was belonging to *Giardia* spp. (24.2 %) and the lowest was belonging to *Haemoproteus* spp. (6.1 %). *Cryptosporidium* spp., *Plasmodium* spp. and *Trichomonas gallinae* were found in 7.2, 8.2 and 17 % of waterfowl, respectively.

Table 3 Prevalence and intensity of helminth infection in *Anas platyrhynchas*

Name of parasite	No. of host infected		Total	Prevalence, %	Intensity
	Male	Female			
Railletina tetragona	5	3	8	26.6	19.34 ± 16.5
Heterakis gallinarum	1	3	4	13.33	14.65 ± 12.5
Capillaria	2	1	3	10	12.56 ± 16.5

In this research, statistical analysis showed no significant difference between male and female ducks in parasitic infection ($P > 0.05$). However, in a previous study by Shemshadi et al. (2014) in *wild fowl*, cryptosporidiosis *was statistically* higher in *females* than in males (*Trichomonas gallinarum* has been found in the lower digestive tract and caeca of chickens and other gallinaceous birds (McDougald et al., 1997). Silvanose et al. (1998) studied 114 captive *houbara bustards*; 49 cases (43 %) were found to be positive for protozoa including 34 cases (29.8 %) *T. gallinarum*, 12 cases (10.5 %) *Chilomastix gallinarum*, one case (0 9 %) *Lophomonas* spp. and one case (0.9 %) *Giardia* spp. In the current study, 23.3 % of examined domesticated ducks were infected with *T. gallinae* which the rate of infection was similar to that of Silvanose et al.

Prevalence of haemoprotozoan spp. and pathological changes in ducks were determined by Dey et al. in 2008. They found the prevalence of *Lecucocytozoon* species such as *Leucocytozoon caullery* (54.67 %) and *Leucocytozoon simondi* (5.33 %) in ducks and the rate of haemoprotozoa infection was significantly ($P < 0.01$) higher in male (78.94 %) than female ducks (53.57 %). Our study did not find *Leucocytozoon* infection in ducks from Gilan Province. It was suggested that lack of suitable vectors (for example, *Stomoxys* spp.) for transmission of this kind of haemoprotozoan in this area is the reason of absence of *Leucocytozoon* spp.

Kuhn et al. in 2002 examined faecal samples from wild ducks and found *Cryptosporidium parvum* oocysts and *Giardia* cysts in samples; however, they were not detected in molecular examinations. In this study, *Giardia* cysts were not identified but *Cryptosporidium bailey* was.

In conclusion, this study found various kinds of parasitic infection in domesticated ducks in Gilan Province, Northern Iran. Findings indicate that applying protocols of management and applying preventative methods and treatment of infected cases are necessary to restrict parasitic infections in domestic ducks and other birds in this region. Also, more parasitological studies about infections in all kinds of birds in this area were proposed by the authors to find more evidence for solving the problem.

Acknowledgments The authors are particularly indebted to the Faculty of Veterinary Medicine, Garmsar Branch, Islamic Azad University.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

Cable RM (1957) An illustrated laboratory manual of parasitology, 4th edn. Burges Publishing Co., Minneapolis 15, Minnesota, pp. 114–115

Dey AR, Begum N, Anisuzzaman MA, Khan H (2008) Haemoprotozoan infection in ducks: prevalence and pathology. Bangl. J. Vet. Med. 6(1):53–58

Farzana T, Islam K, Mondal MMH (2008) Population density of helminths in ducks: effects of host's age, sex, breed and season. Bangl J Vet Med 6(1):45–51

Graham P (1986) Official website of the Australian Government. www.primaryindustry.nt.gov.au

Kuhn RC, Rock CM, Oshima KH (2002) Occurrence of *Cryptosporidium* and *Giardia* in wild ducks along the Rio Grande River Valley in Southern New Mexico. Appl Environ Microbiol 68: 161–165

Levine ND (1985) Veterinary protozoology, 1st edn. Iowa State University Press, Ames, pp. 266–282

McDougald LR, Fuller L, Mattiello R (1997) A survey of Coccidia on 43 poultry farms in Argentina. Avian Dis 41:923–929

Shemshadi B, Ranjbar-Bahadori S, Faghihzadeh-Gorji S (2014) Occurrence of parasitic protozoa in wild waterfowl in southern coastal Caspian Sea lagoons. Iranian Journal of Veterinary Medicine IJVM 8(4):261–267

Silvanose CD, Bailey TA, Samour JH, Naldo JL (1998) Intestinal protozoa and associated bacteria in captive Houbara bustards (*Chlamydotisundulata*) in the United Arab Emirates. Avian Pathol 28:94–97

Soulsby EJL (1982) Helminths, arthropods and protozoa of domesticated animals, 7th edn. Baillere Tindall and Cassell Ltd., London, pp. 366–387

Springer WT (1997) Other blood and tissue protozoa. In: Calnek BW, Barnes HJ, Beard HJ, McDougald LR, Saif YM (eds) Diseases of poultry, 10th edn. Iowa State University Press, USA, pp. 900–911

Wall R, Shearer D, (2001) Veterinary ectoparasites; biology, pathology and control. pp 76–93

Yamaguti S (1958a) *Systema Helminthum*. Vol 1. The digenetic trematodes of vertebrates. Interscience Publishers Inc., New York, USA, p. 979

Yamaguti S (1958b) *Systema Helminthum*. Vol II. The Cestodes of vertebrates. Interscience Publishers Inc., New York