



A Survey of Intestinal Parasitic Infection Among Domestic Pigeons in Misurata, Libya

Layla O. Elmajdoub and Kholoud A. Mshiheet

Zoology Department, Faculty of Science, Misurata University, Misurata, Libya

Abstract— The current study was conducted to detect the prevalence of parasitic infection among (38) domesticated pigeons (*Columbia livia*), while 4 pigeons are young and 34 are adults, with weights between 105 - 410g of all examined pigeons. The results revealed that 29 (76.3%) out of 38 examined pigeons were infected with intestinal parasites and the incidence rates were 2 (5.3%) in younger and 27 (71.1%) in adult pigeons. The highest rate of helminthic infection about (72.4%) following (48.3%) of infection with protozoa, while the mixed infection with helminths and protozoa around 20.7%. Furthermore, the nematodes (65.5%) were more infected in pigeons compare with cestodes (31%), also there were seen mixed infection with nematodes and cestodes together in the same pigeon. *Capillaria columbae* and *Ascaridia galli* were nematodes and *Raillietina cesticillus* and *Cotugnia digonophora* were cestode could detect from the digestive tract of pigeons, also *Eimeria* oocyst was identified. From the parasitic fauna seen in this study and from the statistical analysis, there no any correlation and significant differences ($P>0.05$) between the weight of pigeon and the density of infection. Also, it is imperative to institute an integrated parasitic control of pigeons.

Keywords: *Columbia livia*, internal parasites of pigeons and intestinal parasite

INTRODUCTION

The domestic pigeons, whose relation with traces back to ancient time, are cosmopolitan birds [1] and those of the order Columbiformes can be found in virtually every town and the city around the globe [2]. Also, they live side by side in nature and they are bred as a source of food as a hobby, symbol and for experimental aims [3]. Usually, the domestic pigeons (*Columbia livia*) are highly susceptible to infection with a large number of internal parasites and cause heavy economic losses in the form of related growth, decreased production,[4,5] . They feed on the wide range of food items including grains, slugs, earthworms and insects that in many instances may carry infective stages of intestinal parasites [6]. Although the prevalence and intensity of intestinal parasites from the previous studies in Egypt and Iraq between domestic pigeons were recoded various species of helminths and protozoa, demonstrated that the prevalence rate with cestoda in pigeons about 73% from Iraq[7], also [8], from Iran found 42.15% of pigeons were infected with one or more species of helminths. Moreover, Najwa *et al.* [9] from Egypt were found the prevalence rate of helminths from the digestive system of pigeons were 51.7%. Currently, the information on the endo-parasites of domesticated pigeons in different regions of Libya appears to be poorly documented, and no previous studies have been performed in relation to parasitic infections in pigeons from this work. The aim of this study was to determine the prevalence rates and species of intestinal parasites in domestic pigeons (*Columbia livia*) from the Misurata region in the north of Libya.

MATERIALS AND METHODS

**Study area:**

A study was carried out in different parts of the Misurata region in the western north of Libya during February to end of May 2016. The samples were taken from 38 pigeons (4 squabs and 34 adults). From Misurata, this region, western north of Libya is geographically located at latitude 32°22'39.12"N and longitude 15°05'31.26"E based on the map of the world.

Sample collection:

The pigeons were humanely killed, dissected and necropsied, the digestive system was removed intact and the various sections (oesophagus, proventriculus, gizzard, duodenum, jejunum, ileum, caeca and rectum) separated and placed in petri dishes containing 0.9% physiological saline.

Sample examination:

Each section was cut longitudinally to expose its content and examined under a dissecting microscope to isolate the parasitic worms, [10]. The macroscopic worms were isolated after being washed by showering them several times to remove the stuck materials of the host alimentary canal. Moreover, the cestodes were put in warm water (45°C) for 12-24 hours to get good results, and putting them in pure Glycerin for a few hours, after fixation, a process of dehydration was applied gradually by treating them with graded alcohol as 30%, 50% and 70% then dyed with semichons acid carmine according to the way explained by (Cable, 1985). Furthermore, again dehydrated through acid alcohol (1% HCL in 70% ethyl alcohol), 70%, 90% and absolute ethyl alcohol, cleared by xylol and mounted in DPX [11]. Whereas the Nematodes were killed extended by using hot 70% ethyl alcohol and preserved in 70% ethyl alcohol containing 5% glycerine, Lactophenol was used as a clearing agent [12]. Depending [13-17] were identified of different parasites from the pigeon digestive system.

Statistical analysis:

The relationship between the weights of infected and non- infected pigeons was applied as defined by [18]. Student T-test and correlation R were employed to determine the possible association between parasite infection and host weights. All tests were performed using the SPSS computer software.

RESULTS AND DISCUSSION

3-1 Prevalence of parasitic infections in *Columba livia domestica* at Misurata

Out of the 38 domestic pigeons examined, 29 (76.3%) were infected with different species of gastrointestinal parasites comprising 2 species of cestodes (*Raillietina cesticillus* and *Cotugnia digonophora*); 2 species of nematodes (*Capillaria columbae* and *Ascaridia galli*) and species of *Eimeria*. In general, there were 22 pigeons infected with helminths (72.3%), while 14 (48.3%) of *Eimeria* species. Table 1 illustrated the prevalence rates of parasitic infections (nematodes 19 (65.5%) and cestodes 9 (31%) and appeared the prevalence of single infection with coccidia oocysts was higher than those of helminths infections, while the mixed infections with helminths were higher than that of coccidian oocysts. Moreover, the total infection of helminths was found about the 51.7% .

Table (1): Prevalence of parasitic infections in *Columba livia domestica* at Misurata.

	Helminths infection		Protozoa infection
	Nematode infection	Cestode infection	Eimeria spp.
Singleinfection	6(40%)	4 (44.4%)	8 (57.1%)
fixed infection	9**(60%)	5 (55.5%)	6 (42.9%)
Total infection	15**	9	14
P value	NS	NS	NS

** 4 cases were found mixed infection with two species of nematodes.

NS= non- significant difference ($P>0.05$).

3.2 Prevalence of intestinal parasitic species in *Columba livia domestica* at Misurata

Table (2) illustrated the species of cestodes encountered include *Raillietina cesticillus* 6 (14.3%) was a higher prevalence than *Cotugnia digonophora* 3 (7.14%), while the nematodes were *Ascaridia galli* Schrank, 1788 7 (16.7%), and *Capillaria columbae* 12 (28.8%), thus from these finding the prevalence rates of nematodes were higher than those of cestodes. The predilection site for the cestodes and coccidian oocysts were found in the small intestine (duodenum, ileum), while the nematodes were found in the small intestine (duodenum, ileum) and also caeca. Whereas, non- significant differences ($P> 0.05$) between the prevalence rates of different species of parasite infections.

Table (2): Prevalence of intestinal parasitic species in *Columba livia domestica* at Misurata

	No. infected pigeon	%
<i>Raillietina cesticillus</i>	6	14.3%
<i>Cotugnia digonophora</i>	3	7.14%
<i>Ascaridia galli</i>	7	16.7%
<i>Capillaria columbae</i>	12	28.6%
<i>Eimeria</i> oocysts	14	33.3%

The mean weight of infected Pigeons was $255.2 \text{ g} \pm 12.6$ compared to $333.8 \text{ g} \pm 11.2$ for non – infected Pigeons. These two weights were significantly different ($P= 0,002$) indicating that the presence of parasites has probably caused some effects on their health. Intestinal parasites have been reported as a pathogen to pigeons causing anaemia among other clinical signs. Moreover, there is no correlation ($r= 0.148$) and significant differences ($P> 0.05$) between the weight pigeons and the density of parasite infection.



DISCUSSION

The domestic pigeons kept under intensive management should have an extremely low parasite tolerance with proper hygiene and good management [19]. Whereas, high parasitic infections may, therefore, be an indication of poor management and control. The result from this study showing the helminth infection to occur the most of the pigeons (72.3%) is considered to high compared with other studies from different areas; for example, [20] have reported that 48.3% of pigeons were infected with helminth infection from Nigeria, [21]

In Iran reported 42% were infected with one or more species of helminths. The high prevalence of helminth infection recorded in this study could be an indication of a high incidence of the infective stages and intermediate hosts of the parasites in places where these pigeons are reared. Also, the transfer methods of these parasites are abundant and may easily infect to the pigeons during in search of food.

The prevalence rate of *Eimeria* spp infection was 48.3% in this study and similar with [22] from Nigeria (49.2%), while [23] from India recorded the high infection rate with *Eimeria* spp (77%) compared with the present study, usually the reason for the high infection with *Eimeria* spp may be due to the high temperature and humidity were recorded their results and these were the optimal conditions for the sporulation of oocysts. Coccidiosis usually runs without clear clinical manifestations. Coccidiosis affected pigeons look like healthy, but has watery diarrhea, [24].

The prevalence of nematodes (65.5%) recorded in this study is higher than those of Adang *et al.* [25] and Natala *et al.* [22] from Nigeria, whereas that Parsani *et al.* [23] from India (85%) was higher than that of this study, they may cause severe debility, morbidity and lessening in vitamin A, B1 and B12, minerals, carbohydrates and proteins [26]. Furthermore, *Capillaria columbae* is one of the most common (28.8 %) helminth species in the present study, and higher than that of *Ascaridia galli* (16.7%), *Capillaria* infections were observed in pigeons along with *Ascaridia galli*, causing cachexia and haemorrhagic enteritis, [27]. Prevalence of *Capillaria* spp. And *Ascaridia galli* infections were higher than those of the previous studies who recorded the occurrence of *Capillaria* spp. And *Ascaridia galli* infections in pigeons from India, [28].

In the present study, two species of tapeworms were found *Raillietina cesticillus* which was the most prevalent cestode, (14.3%) and followed by *Cotugnia digonophora* (7.14%). It was lower compared with the other studies conducted by Adang *et al.* [25] from Nigeria, Abed *et al.* [29] from Iraq. Usually, the infective stages are carried by arthropods serving as intermediate hosts (ants, beetles), in addition to fruits and seeds form the major part of the diet of pigeons [25,30].

The high prevalence of mixed infection of helminths compared to single in the pigeons, while the highest rate of single infection was occurring only in 57.1% of *Eimeria* spp. The results of this study clearly illustrated that the multi-species infection of parasites in Pigeons was more presence compared to single species infection, suggesting the pigeons could be more suitable to mixed infections than other birds. According to these findings, that difference in the number of examining pigeons and the prevailing environmental conditions and availability of intermediate hosts in the study area may have been responsible for the differences observed.

Parasitic infection in pigeons can be affected by food supply, geographic location, and climatic conditions, also further studies are needed to determine the effects of the parasites on the health and productivity of the Pigeons.



Acknowledgments: The authors are grateful to the Dean of Zoology department, Misurata University for providing the facilities for carrying out the research and to Miss Fatma Aboshahmah for technical assistance.

REFERENCES

1. Sari B., Karatepe B., Karatepe M. and Kara M.; Parasites of domestic pigeon (*Columba livia domestica*) and wild (*Columba livia livia*) pigeons in Nigde, Turkey. *Bull Vet Inst Pulawy*, 2008, **52**, 551-554.
2. Marques S.M, Quadros RM, Da-Silva CJ, Baldo M.; Parasites of pigeons (*Columba livia*) in urban areas of langes, Southern Brazil. *Parasitol Latinoam*, 2007, **62**, 183-187.
3. Harlin R.W.; Pigeon. The Veterinary clinics of North America. *J. Small animals practice*, 1994, **24**, 157-173.
4. Ghazi R.R., Mansour N. K and F. M. Bilqees.; Palluterina karachiensis sp. n. (Cestoda: Anaplocephalidae) from the wild pigeon *Columba livia* Gmelin. *Turk. J. Zool.*, 2006, **26**, 27-30.
5. 5 Borghare A.T, Bagde V.P, Jalukar A.D, Katre D.D, Jumde P.D, Maske D.K and Bhangale G.N. Incidence of gastrointestinal parasitism of captive wild pigeon at Nagpur. *Veterinary World*, 2009, **2**, 343.
6. Patel, P.V., Patel A. I., Sahu R. K. and Vyas R.; Prevalence of gastrointestinal parasites in captive birds of Gnjarat zoos. *Zoos' print J.*, 2000, **15**, 295-296.
7. Al-Bayati N. Y.; A study on pigeons (*Columba livia*) Cestodes infection in Diyala Province. *Diyala Agri.Sci. J.* 2011, **3**, 1-12.
8. Radfar M.H., Asl E.N, Seghinsara H.R., Dehaghi M.M. and Fathi S., Biodiversity and prevalence of parasites of domestic pigeons (*Columba livia domestica*) inaselected semiarid zone of South Khorasan, Iran. *Trop Anim Health Prod., Bhattacharyy*, 2012, 44(2):225-229.
9. Najwa E.A., Loubna M.A., El-Madawy R.S. and Toulan E.I.; Studies on helminthes of poultry in Gharbia governorate. *Benha Veterirany Medical Journal*, 2013, **25**, 134-144.
10. Fatihu M., Ogboya, V.C., Njoku C.V. and Sanor D.I., Comparative studies of gastrointestinal helminths pf pourty in Zaria, *Rev. Elev. Med. Vet. Pays. Trop.*, 1985, **44**, 175-177.
11. 11Tasawar Z., Aziz and Akhtar M.; Prevalence of cestode parasites of domestic fowl. *Pakistan. Vet.* 1999, **19** (3): 142-144.
12. Kruse O.W. Pritchard M.N, Collection and preservation of animal parasites Technical bull.1 Univ. *Nebraska lincolon and London*, 1982, p 141.
13. Kruse O.W. Pritchard M.N, Collection and preservation of animal parasites Technical bull.1 Univ. *Nebraska lincolon and London*, 1982, p 141.
14. Soulsby E.J.L. (1982) Helminths, arthropods and protozoa of domesticated animals. 7th Edn., Bailliere Tindall, London.
15. Cheng T.; General Parasitology. Academic press, New York, San-Francisco and London, 1973.



16. Ruff M. D.; Nematodes and acanthocephalans. In: Hofstad, M. S., Barnes, H. J., Calnek, B.W., Reid, M.W. and Yoder Jr., H.W. (Eds), Diseases of Poultry. 8th Edition, Iowa State University Press, USA, 1984.
17. Ruprah N. S., Chaudri S. S. and Gupta S. K.; General parasitology and platyhelminthes In: Parasitological Manual: 1 Haryana Agricultural University Hisar 125004, 1986.
18. Margolis L., Esch G. W., Holmes J. C., Kuris A. M. and Schad, G. A.; The use of ecological terms in Parasitology. (Report of an Ad Hoc Committee of the American Society of Parasitology). *Journal of Parasitology*, 1982, **68**, 131-133.
19. Atsineka O. K. & Banke R. O. K.; Gastro-intestinal helminth parasites of Domestic Pigeons (*Columba livia domestica*) in Makurdi Metropolis, Benue State, Nigeria. *Book of Abstracts, 3rd Annual Conference of Zoological Society of Nigeria (Keffi 2006) 7th-10th November, 2006*.
20. Adang K.L., Oniye S.J, Ezealor A.U, Abdu P.A. and Ajanusi O.J.; Ectoparasites of domestic pigeon (*Columba livia domestica* Linnaeus) in Zaria, Nigeria. *Research Journal of Parasitology*, 2008, **3**, 79-84.
21. Mohammad H.R., Saeid F., Ehsan N.A., Mohammad M.D. and Hadi R.S.; A survey of parasites of domestic pigeons (*Columba livia domestica*) in South Khorasan, Iran. *Veterinary Research*, 2011, **4**, 18-23.
22. Natala A.J., Asemdahm N. D., Okubanjo O.O. and Ulayi B.M.; A Survey of parasites of domesticated pigeon (*Columba livia domestica*) in Zaria, Nigeria. *International Journal of soft of computer*, 2009, **4**, 148-150.
23. Parsani H. R., Momin R.R., Lateef A. and Shah N.M.; Gastro-intestinal helminths of pigeon (*Columba livia*) in Gujarat, India. *Egyptian Journal of Biology*, 2014, **16**, 63-71.
24. Reddy B.S, Sivajothi S., and Rayulu V.C.; Clinical coccidiosis in adult cattle. *J Parasit Dis*, 2015, **39**(3): 557-559.
25. Adang L.K.; Some aspects of the biology of four columbid species in Zaria, Nigeria. *M.Sc. Thesis, Ahmadu Bello University, Zaria, Nigeria*, 1999.
26. Smyth J. D.; Animal Parasitology. Cambridge University press, Cambridge, U.K, 1994.
27. Hayat C.S., Maqbool A., Hayat B., Badar N. and Ayub S., Prevalence of various endoparasites of domestic pigeons. *Indian Veterinary Medicine Journal*, 1999, **29**: 55-56
28. Sivajothi S. and Reddy S.B.; A study on the gastro intestinal parasites of domestic pigeons in YSR Kadapa district in Andhra Pradesh, India. *Journal of Dairy Veterinary and animal Research*, 2015, **2**, 1-3.
29. Abed A.A., Naji H.A. and Rhyaf A. G.; Investigation study of some parasites infected domestic pigeon (*Columba livia domestica*) in Al-Dewaniya city. *Journal of Pharmacy and Biological Sciences*, 2014, **9**, 13-20.
30. Mushi F.Z, Binta M.G., Chabo R.G., Ndebele R. and Panzirah R.; Parasites of domestic pigeons (*C. l. domestica*) in sebele garborone, Botswana. *Journal of the South African Veterinary Association*, 2000, **71**, 249-250.