

## Prevalence of gastrointestinal parasites in domestic pigeons in Van province

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### Research Article

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### ABSTRACT

This study aimed to determine the prevalence of intestinal parasites in pigeons raised for hobby or different purposes in Van province and to help develop protective measures for their healthy lives. The fecal material of the study was collected from 240 domestic pigeons randomly selected from 26 different cages raised for hobby purposes in Van province. Native, flotation, and sedimentation techniques were used for the examination of fecal samples. *Eimeria* spp. oocysts were sporulated in 2.5% potassium dichromate to identify the species. In the study, 219 of the 240 (91.25%) - samples were found to be infected with one or more parasite species. There were five helminth species among the identified parasite species: *Capillaria* spp., *Ascaridia columbae*, *Heterakis gallinarum*, *Raillietina* spp. and *Syngamus* spp. In addition, two protozoan species, *Eimeria columbarum* and *Eimeria labbeana*, were detected as enteric protozoa. The most common parasite species in the examined fecal samples were as follows: *Eimeria columbarum* (63 samples, 26.25%), *Eimeria labbeana* (58 samples, 24.17%), *Capillaria* spp. (34 samples, 14.17%), *Ascaridia columbae* (22 samples, 9.17%), *Heterakis gallinarum* (11 samples, 4.58%), *Raillietina* spp. (18 samples, 7.5%) and *Syngamus* spp. (13 samples, 5.42%). In conclusion, it was observed in this study that the rate of detection of intestinal parasites in pigeons raised for hobby or different purposes in Van province was high. Therefore, it was concluded that in order to reduce the prevalence of parasitic infections in pigeons in the region, animal owners should be informed, attention should be paid to the cleanliness and hygiene of pigeon cages, and more importance should be given to the diagnosis and treatment of intestinal parasites in these animals.

**Keywords:** Van, pigeon, gastrointestinal parasites

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## Introduction

Pigeons are birds belonging to the Columbidae family of the Columbiformes order, used for meat production, hobby, competition, show, and experimentation purposes (Sales and Janssens, 2003; Yılmaz and Boz, 2012; Attia et al., 2022). These birds can transmit important diseases to other bird species and mammals and contribute to the spread of zoonotic diseases in humans. They are also important because they are reservoirs of many parasitic diseases (Sari et al., 2008; El-Dakhly et al., 2018). Pigeons

pollute the environment through various pathogenic agents and cause the spread of parasites among different animal and bird species with their feces (Attia and Salem, 2021). Many parasites detected in pigeons reduce the performance of these animals, can lead to developmental delays, cessation of egg production, and death (Dranzoa et al., 1999; Şenlik, 2005; Gül et al., 2009). Helminths, in particular, are of great importance due to endoparasite infections in pigeons. In studies conducted worldwide, the presence of

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*Capillaria* spp., *Ascaridia columbae*, *Heterakis* spp., *Dispharynx* spp., *Tetrameres* spp., *Syngamus* spp., *Raillietina* spp., *Cotugnia digonophora* and *Strongyloides avium* have been reported in pigeons (Şenlik, 2005; Gül et al., 2009; Elmajdoub and Mshiheet, 2016; Mehmood et al., 2019; Ali et al., 2020; Walteros-Casas et al., 2021; Das et al., 2022; Thankachan et al., 2022). Helminths are the main responsible for important clinical and subclinical infections in domestic pigeons (Ali et al., 2020). Coccidiosis is one of the important protozoan parasites in pigeons as in other poultry animals. The presence of *Eimeria labbeana*, *E. columbae*, *E. columbarum*, *E. pfeifferi*, *E. tropicalis*, *E. janovyi*, *E. waiganiensis*, *E. curvata*, *E. gourai* and *E. duculai* species have been reported in studies conducted in the environment. In Turkey, the presence of *E. labbeana*, *E. columbarum* and *E. columbae* has been reported in domestic pigeons (Sarı et al., 2008; Gül et al., 2009). There are a limited number of studies on the detection of parasites in domestic and wild pigeons in Turkey. This study aimed to determine the prevalence of intestinal parasites in pigeons raised for hobby or different purposes in Van province and to help develop preventive measures for their healthy lives.

## Materials and methods

The study material consists of the feces of 240 domestic pigeons randomly selected from 26 different cages in different cages raised for hobby purposes in Van province between February and September 2022. The necessary permission for the study was obtained from Van Yuzuncu Yil University Animal Experiments Local Ethics Committee (decision dated 24/02/2022 and numbered 2022/02-04). The fecal samples collected in the pigeon cages were placed in feces containers and brought to Van Yuzuncu Yil University, Faculty of Veterinary Medicine, Department of Parasitology laboratory. Samples were examined on the same day as much as possible, and those that could not be examined on the same day were stored in the refrigerator at +4°C. Native, flotation, and sedimentation techniques were used to examine helminths in fecal samples. For enteric protozoa, stool samples were mixed with 2.5% potassium dichromate (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) solution and placed in separate petri dishes to form a thin layer and left to sporulate in the laboratory (Kaya, 2003). After sporulation, the preparations were examined microscopically for the morphological structures of *Eimeria* oocysts and species were distinguished (Levine, 1985; Mimioğlu et al., 1969; Soulsby, 1968).

## Statistical analysis

Statistical analyses were performed using SPSS

(Version. 26) package program. As statistical analysis, the relationship between the species was determined using the Chi-square test. Descriptive statistics are given as numbers and The significance level was accepted as p<0.05.

## Results

In the study, 219 out of 240 (91.25%) pigeon feces samples examined were found to be infected with one or more parasite species. Among the parasite species identified, there were five helminth species: *Capillaria* spp. *Ascaridia columbae*, *Heterakis gallinarum*, *Raillietina* spp. and *Syngamus* spp. In addition, two protozoan species, *Eimeria columbarum* and *Eimeria labbeana*, were found as enteric protozoa.

The most common parasite species in the examined feces samples were as follows: *Eimeria columbarum* (63, 26.25%), *Eimeria labbeana* (58, 24.17%), *Capillaria* spp. (34, 14.17%), *Ascaridia columbae* (22, 9.17%), *Heterakis gallinarum* (11, 4.58%), *Raillietina* spp. (18, 7.5%) and *Syngamus* spp. (13 5.42%). In the study, the number of pigeons infected with helminths was found to be 98 (%40.83), and the number of those infected with enteric protozoa was found to be 121 (%50.41). The number of pigeons infected with both helminths and enteric protozoa was found to be 19 (%7.92). Among pigeons infected with one or more parasite species, the number of those infected with a single species was determined to be 68 (%28.33), the number of those infected with two species was determined to be 56 (%23.33) and the number of those infected with three species was determined to be 5 (%2.08) (Table 1).

## Discussion

Infections caused by endoparasites in pigeons can cause developmental delays, loss of condition and sometimes death. Various studies have been conducted to determine endoparasites in domestic pigeons. In these studies conducted in different regions of our country; *Ascaridia* spp., *Heterakis* spp., *Capillaria* spp., *Raillietina* spp. and *Syngamus* spp. helminths and *Eimeria* spp., *Isospora* spp. and *Cryptosporidium* spp. protozoa were detected (Sarı et al., 2008; Gül et al., 2009; Gökpınar et al., 2023). In this study, five helminth species (*Capillaria* spp, *Ascaridia columbae*, *Heterakis gallinarum*, *Raillietina* spp. and *Syngamus* spp.) and two enteric protozoan species (*Eimeria columbarum* and *Eimeria labbeana*) were detected. As a result of this study, it was determined that 219 (91.25%) of the 240 pigeon feces samples examined were infected with one or more parasite species. In studies conducted in different parts of the world, these rates were reported as between 69.16% and 87.1% in Nepal (Gurung and Subedi, 2016; Adhikari et al., 2022), 81% in Indonesia

**Table 1.** Coccidia and helminth species and their infection rates in pigeons subjected to fecal examination.

| Parasites                     | Types of Parasites                                       | Total number of positive cases in 240 pigeons | Infection rate (%)        | Chi-Square | p       |
|-------------------------------|--|---|---------------------------|------------|---------|
| Helminths                     | <i>Capillaria spp</i>                                    | 34 (16) <sup>a</sup>                          | 14.17 (6.67) <sup>a</sup> | 50.062     | 0.000*  |
|                               | <i>Ascaridia columbae</i>                                | 22 (12) <sup>a</sup>                          | 9.17 (5) <sup>a</sup>     |            |         |
|                               | <i>Heterakis gallinarum</i>                              | 11  | 4.58                      |            |         |
|                               | <i>Raillietina spp</i>                                   | 18 (13) <sup>a</sup>                          | 7.5 (5.42) <sup>a</sup>   |            |         |
|                               | <i>Syngamus spp</i>                                      | 13  | 5.42                      |            |         |
|                               | <i>Capillaria spp+ Ascaridia columbae</i>                | 4   | 1.67                      |            |         |
|                               | <i>Capillaria spp+ Raillietina spp</i>                   | 3   | 1.25                      |            |         |
| Total                         |  | 98  | 40.83                     |            |         |
| Enteric protozoa              | <i>Eimeria columbarum</i>                                | 63 (15) <sup>a</sup>                          | 26.25 (6.25) <sup>a</sup> | 10.949     | 0.004*  |
|                               | <i>Eimeria labbeana</i>                                  | 58 (12) <sup>a</sup>                          | 24.17 (5) <sup>a</sup>    |            |         |
|                               | <i>E.columbarum+E. labbeana</i>                          | 35  | 14.58                     |            |         |
| Total                         |  | 121   | 50.42                     |            |         |
| Intestinal protozoa+ Helminth | <i>Eimeria columbarum+ Capillaria spp</i>                | 8   | 3.33                      | 4.886      | 0.180** |
|                               | <i>E. labbeana+ Ascaridia columbae</i>                   | 6   | 2.5                       |            |         |
|                               | <i>Eimeria columbarum+ E. labbeana + Capillaria spp</i>  | 3   | 1.25                      |            |         |
|                               | <i>Eimeria columbarum+ E. labbeana + Raillietina spp</i> | 2   | 0.83                      |            |         |
| Grand total                   |  | 219   | 91.25                     |            |         |

a = Infection rates with a single species, \* According to the Chi-square test, there is a significant difference between helminths and enteric protozoa infestation rates ( $p < 0.001$ ), \*\* According to the Chi-square test, the relationship between multiple infestations of helminths and enteric protozoa was not found to be statistically significant ( $p > 0.05$ ).

(Ashfiyah et al., 2022), 84.56% in Poland (Bartosik et al., 2020), and 44.10%-86.8% in India (Sivajothi and Sudhakara, 2015; Das et al., 2022; Thankachan et al., 2022). In Turkey, these rates were determined as between 59.6% and 71.72% (Sarı et al., 2008; Gül et al., 2009). In general, the results obtained from endoparasite studies conducted in pigeons around the world are similar to the results obtained in this study. In this study, 40.83% of the positive samples had helminth infection, 50.41% had protozoan infection, and 7.91% had mixed helminth and protozoan infection. In a study conducted in Niğde, it was reported that 58% of domestic pigeons were coccidia positive and 42% were coccidia+helminth positive (Sarı et al., 2008). While other studies found the mixed infection rate in domestic pigeons as 31.8% (Sivajothi and Sudhakara, 2015) and 35.1% (Thankachan et al., 2022), this rate was found to be 60% in pigeons kept at home and 85.6% in pigeons kept around temples (Adhikari et al., 2022). When the fecal samples analyzed in our study were examined in terms of *Capillaria* spp. eggs were found in 14.17% of the pigeon infection with one or more parasite species; were determined as 68 (28.33%) infected with a single species, 56 (23.33%) infected with two species and 5 (2.08%) infected with three species. In studies conducted worldwide on *Ascaridia* spp. in domestic pigeons based on fecal examination; 13.58% in Poland (Bartosik et al., 2020), between 21.66% and 22.6% in Nepal (Gurung and Subedi, 2016; Adhikari et al., 2022), 22% in Libya (Alkharigy et al., 2018), 42% in Indonesia (Ashfiyah et al., 2022) and between 18.60% and 33.3% in India (Sivajothi and Sudhakara, 2015; Das et al., 2022). In studies conducted in Turkey, *Ascaridia* spp. rates were determined as 5.1% in Niğde (Sarı et al., 2008), 11.03% in Van (Gül et al., 2009) and 41.9% in Kırşehir (Gökpinar et al., 2023). In this study, 9.17% *Ascaridia* spp. was detected. The rate in our study was lower than studies worldwide; it was similar to Niğde and Van, but lower than the study in Kırşehir. It is thought that the differences in the results are due to the number of samples examined, the diagnostic methods used and environmental factors. In our study, droppings examined. In other studies conducted in

et al., 2009), 19.9% in Niğde (Sarı et al., 2008) and 33.3% in Kırşehir (Gökpinar et al., 2023). In studies conducted worldwide, it was determined as 32.71% in Poland (Bartosik et al., 2020), 41% in Indonesia (Ashfiyah et al., 2022), 31.67% in Nepal (Gurung and Subedi, 2016) and 9.30% in India (Das et al., 2022). The results of this research are similar to studies conducted in the world and Turkey.

*Heterakis* spp. detected in different provinces of Turkey. egg rates were reported as 3.7% in Niğde (Sarı et al., 2008), 6.2% in Van (Gül et al., 2009) and 12.4% in Kırşehir (Gökpinar et al., 2023). It was determined as 45% in Tuban, Indonesia (Ashfiyah et al., 2022) and 2.5% in Nepal (Gurung and Subedi, 2016). In this study, the rate of *Heterakis* spp. was found as 4.6%, which is similar to the studies conducted in Niğde, Van, and Nepal. However, lower rates were found in the studies in Kırşehir and Indonesia. It is estimated that the differences in the results regarding *Heterakis* spp. may be due to the number of samples examined, rearing conditions and environmental factors.

Coccidiosis is one of the most important protozoal infections of poultry. In previous studies conducted in Turkey, *Eimeria* spp. rates in domestic pigeons were determined as 59.6% in Niğde, 67.58% in Van, and 68.6% in Kırşehir (Sarı et al., 2008; Gül et al., 2009; Gökpinar et al., 2023). In studies conducted worldwide, rates between 8.13% and 39.5% in India (Sivajothi and Sudhakara, 2015; Das et al., 2022; Thankachan et al., 2022), 8.1% in Iraq (Ul-Jabbar et al., 2019), 36% in Colombia (Walteros-Casas et al., 2021), 40.9% in Iran (Radfar et al., 2012) and 80.86% in Poland (Bartosik et al., 2020) were reported. In this study, the *Eimeria* spp. rate was found to be 50.41%. While this rate is similar to the rates detected in other studies conducted in Turkey, it differs from studies conducted worldwide.

## Conclusion

As a result, it is observed that the rate of intestinal parasites detected in pigeons raised for hobby or different purposes in Van province is high in this study. This situation shows that parasitic control is not carried out at an adequate level. It was concluded that in order to reduce and control the rate of parasitic infection in pigeons in Van province, animal owners should be informed about this issue, attention should be paid to the hygiene of pigeon cages and coops, and importance should be given to the diagnosis and treatment of parasitic diseases in animals.

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