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Evaluating the Prevalence of *Isospora* in Parrots in Golestan Province

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Abstract

Introduction: Parasitic infections in pet birds are common issues in veterinary medicine. *Isospora* is an important pathogenic agent in birds, particularly in various species of parrots, causing diarrhea and feather loss. This study investigates the prevalence of *Isospora* infection in parrots in Golestan Province.

Materials and Methods: In this study, fecal samples were collected from parrots that were brought to veterinary clinics in Golestan Province by their owners between October 2022 and May 2023, as well as from parrots kept in pet shops. The samples were examined using the sucrose flotation method.

Results: Among the 51 samples examined, 6 birds showed clinical signs of lethargy, 12 exhibited feather loss, and 9 had watery diarrhea. The results of both the flotation and direct microscopic examinations indicated that none of the birds were infected with *Isospora*.

Conclusion: The findings suggest a low prevalence of *Isospora* in parrots of Golestan Province. Based on the negative test results, it can be concluded that *Isospora* is not widely prevalent in this region, and the clinical symptoms observed in parrots are likely due to other parasitic, bacterial, or viral infections.

1. Introduction

Isosporiasis is a parasitic disease caused by protozoa of the *Isospora* genus, which has been reported in various species of migratory, domestic, and caged birds (Lindsay *et al.*, 1997). Several studies have shown that many bird species have co-evolved with specific species of *Isospora*. The severity of this disease can range from subclinical infection to severe and fatal cases. The transmission of this parasite among captive birds, especially species at risk of extinction or those kept for breeding and reintroduction programs, is a significant concern (Goodgame, 1996).

One of the critical issues in bird care facilities is assessing the impact of housing different bird species in shared enclosures on the risk of severe isosporiasis caused by host-incompatible *Isospora* strains. Further research is needed to better understand interspecies transmission of this parasite and potential host shifts (Maria de Fatima *et al.*, 2025).

Isosporiasis is a type of coccidiosis caused by *Isospora*, although other protozoa can also be responsible for the disease. Epidemiological studies have shown that *Isospora* is significantly prevalent among wild bird populations. This parasite has a complex life cycle, which includes an intestinal phase and possibly a systemic phase, the latter of which may be associated with atoxoplasmosis. Both intestinal and systemic isospori-

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asis can lead to severe mortality in bird populations, including rare and endangered species (Chen *et al.*, 2025). While anticoccidial treatments have been effective against intestinal isosporiasis, no definitive treatment has been reported for its systemic form. Infected birds may exhibit symptoms such as feather loss, lethargy, and diarrhea, which, if not diagnosed and treated promptly, can lead to mortality (Tokiwa *et al.*, 2025).

Despite the known impact of *Isospora* on ornamental birds, its prevalence in parrots, particularly in Golestan Province, remains unclear. Investigating this parasite in local parrot populations will help bridge this knowledge gap and provide insights into its epidemiology. Comprehensive research in this field can contribute to a better understanding of the disease's epidemiology, improve control strategies, and reduce the risks associated with this parasite in valuable bird populations.

2. Materials and Methods

2.1. Study Type and Population

This study was a descriptive, cross-sectional investigation conducted on parrots in Golestan Province to determine the prevalence of *Isospora* infection. The study included parrots brought to veterinary clinics by their owners between October 2022 and May 2023, as well as parrots kept in pet shops within the province.

2.2. Sampling and Sample Preparation

Fecal samples were collected from various parrot species during the specified period. For sample preparation, 2 grams of feces were collected from each bird. Initially, a direct smear was prepared from each sample and examined microscopically. The samples were then mixed with 10 mL of distilled water in a beaker and stirred continuously for 5 minutes to obtain a homogeneous solution.

Once homogenized, the solution was filtered and transferred into a test tube. The tubes were centrifuged at 1,500 rpm for 5 minutes. After centrifugation, the supernatant was discarded, leaving only the sediment at the bottom of the tube. A pre-prepared saturated sucrose solution was then added to the tube until the liquid level reached halfway. The mixture was carefully stirred again to ensure uniformity. After adding more sucrose solution to completely fill the tubes, they were left undisturbed for 20 minutes. Finally, a microscopic slide was prepared from the surface of the sample for further examination.

3. Results

Out of the 51 samples examined, 6 birds (11.7%) exhibited clinical signs of lethargy, 12 birds (23.5%) showed feather loss, and 9 birds (17.6%) had watery diarrhea. The results from both flotation and direct examination methods revealed that none of the birds were infected with *Isospora* (Fig. 1).

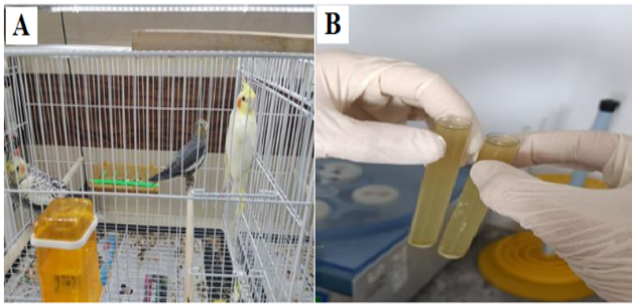

Fig. 1. Collected Samples from Parrots in Golestan Province. A) Studied parrots B) Sucrose flotation method

Among the studied birds, the species most frequently reported were cockatiels (*Nymphicus hollandicus*) with 26 cases, lovebirds (*Agapornis* roseicollis.) with 9 cases, and budgerigars (*Melopsittacus undulatus*) with 7 cases (Table 1).

Table 1
Prevalence of *Isospora* and Clinical Symptoms in Studied Parrots by Bird Species

Bird Species	Frequency (%)	Isospora		Clinical Symptoms			
		Positive	Negative	Diarrhea	Feather loss	Lethargy	Asymptomatic
Nymphicus hollandicus	26 (51)	0	26	4	5	2	15
Agapornisroseicollis	9 (17.6)	0	9	3	2	2	2
Melopsittacusundulatus	7 (13.7)	0	7	1	2	1	3
Psittaculakrameri	6 (11.8)	0	6	1	1	1	3
Aratingasolstitialis	2 (3.9)	0	2	0	1	0	1
Pyrrhuramolinae	1 (2)	0	1	0	1	0	0
Total	51 (100)	0	51	9	12	6	24

4. Discussion

Parasitic infections represent a significant health concern for both domestic and wild birds, potentially having adverse effects on their overall well-being. Protozoa, such as *Eimeria* and *Isospora*, are among the leading causes of gastrointestinal infections in birds. While *Isospora* is more commonly found in passerines, *Eimeria* is prevalent in industrial poultry farms and pigeons (Hemmati *et al.*, 2023). These parasites can cause a range of clinical signs, including bloody diarrhea, depression, anorexia, and, in severe cases, mortality (Sanchez-Cordon *et al.*, 2007).

In this study, we investigated the presence and prevalence of *Isospora* infections in parrots in Golestan Province. Our findings revealed a very low prevalence of this infection among captive parrots in the province. These results contrast with previous studies that reported a higher prevalence of *Isospora* in other domestic and wild birds.

Relatively few studies have investigated parasitic infections in domestic birds in Iran. One such study by Tavasoli M *et al.* (2004) examined gastrointestinal parasites in domestic birds in Urmia, finding that approximately 47% of the canaries studied showed signs of infection (Tavasoli and Dastjerd, 2004). Another study by Islampanah *et al.* (2015) in Tehran and Alborz provinces focused on the prevalence of various *Eimeria* species in poultry, discovering multiple *Eimeria* species in both broiler and laying flocks (Islampanah *et al.*, 2015).

International studies have also examined similar topics. For example, Freitas *et al.* (2003) investigated coccidiosis in canaries in Brazil and found that 167 out of 327 canaries had coccidial infections (De Freitas *et al.*, 2003). Saki *et al.* (2012) studied 64 canaries in Turkey of which 18 were infected with *Isospora* (Saki and Ozer, 2012). A study conducted in New Zealand found that around 40% of migratory birds were infected with various parasites, although no clinical symptoms were observed. In Iran, Hemmati *et al.* (2022) examined *Isospora* and *Toxoplasma* infections in deceased canaries and reported that 7 out of 50 canaries examined had oocysts in their feces (Hemmati *et al.*, 2023).

There are several factors that can influence the results of studies on parasitic infections in birds, including the species studied, geographic location, bird management practices, and the environment in which birds are kept. For instance, in this study, we focused only on parrots brought to veterinary clinics or housed in pet shops, while many other studies have examined wild birds or passerines.

One possible reason for the lack of observed *Isospora* infections in this study could be the captivity of the birds. Captive domestic birds typically have limited contact with wild birds and are generally exposed to fewer environmental parasites. In contrast, wild birds are often exposed to a broader range of parasites, and the prevalence of parasitic diseases among them is higher (Box, 1975). Additionally, the level of awareness among bird owners and pet shop employees regarding avian parasitic infections may have influenced the findings.

Furthermore, this study relied solely on microscopic methods and standard tests for detecting *Isospora*. It is recommended that future studies incorporate molecular techniques, such as PCR (Polymerase Chain Reaction), to more accurately identify *Isospora* infections. These methods offer higher sensitivity and accuracy and are capable of detecting cases that might otherwise go undiagnosed.

Considering that 52.9% of the birds in this study exhibited at least one clinical sign, and *Isospora* was not identified, we suggest that future studies investigate other common parasitic, bacterial, and viral infections in parrots to identify the underlying causes of these clinical symptoms. These diseases can significantly impact bird health and welfare, and their investigation could contribute to improved health management in bird populations.

In conclusion, this study indicates that *Isospora* has a low prevalence in parrots in Golestan Province. This finding may contribute to improved health monitoring and the prevention of parasitic diseases in domestic and ornamental birds. However, it is important to note that the negative results do not definitively rule out *Isospora* infection in parrots. Factors such as the timing of tests, sample collection and transportation methods, and the sensitivity of the testing methods used can all affect the accuracy of the results. Therefore, we recommend further studies to assess the prevalence of *Isospora* in different regions, which will provide a better understanding of its distribution and epidemiology.

5. Conclusion

The results of this study, which indicate the absence of *Isospora* infection in parrots in Golestan Province, suggest a low prevalence of this parasite in the region. However, to enhance the accuracy of the findings and provide a more comprehensive understanding of *Isospora* prevalence in parrots, it is recommended that long-term studies with larger sample sizes be conducted. Such studies will offer more reliable data and improve our ability to assess the true distribution of this parasite in parrots within the province.

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