Mini Review

Prevalence of *Trichomonas gallinae* in Birds of Iran and its Pathological Findings: A Review study

Ebrahimi Ahmadabad, A[1], Taeifi Nasrabadi, N[2], Momeni, Z[2], Shemshadi, B[1*]

1. *Department of Microbiology, Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran*
2. *Department of Microbiology, Karaj Branch, Islamic Azad University, Karaj, Iran*

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Corresponding Author's E-Mail:
BaharShemshadi@yahoo.com

ABSTRACT

Trichomonas gallinae is a flagellated protozoan parasite that affects numerous avian species worldwide, causing a range of diseases collectively termed trichomonosis. This review study aimed to present a comprehensive analysis of the prevalence of *T. gallinae* in birds of Iran, along with an exploration of its associated pathological findings. Through an extensive search of published studies, scientific databases, and relevant literature, we identified several studies conducted in Iran that focused on the prevalence of *T. gallinae* in different bird populations and their pathological effect. These studies utilized a variety of techniques, including direct microscopic examination, culture methods, and molecular tools to detect and identify the presence of this parasite. This review study indicates that *T. gallinae* infections are prevalent among various bird species in Iran, including Domestic pigeons, Zebra Finches, and Turkey. The reported prevalence rates showed significant differences among various regions and bird species, ranging from as low as 2.5% in zebra finches to as high as 70% in pigeons. The clinical signs of infected birds varied from no clinical signs to visible yellowish-white masses of caseous necrotic material, hyperplasia of mucous cells, and significant congestion of the lung. These findings underline the importance of *T. gallinae* as a significant pathogen affecting avian populations in Iran. Using at least two techniques, such as culture or PCR, in addition to direct smear is recommended for better diagnosis of infection. The present study highlights the need for further epidemiological studies to better understand the risk factors associated with *T. gallinae* transmission and to develop effective prevention and control strategies.

Keywords: Bird, Prevalence, *Trichomonas gallinae*

1. Introduction

Iran is a vast country located in the Middle East, with a diverse landscape and an incredible biodiversity. The climate of this country is influenced by its geographical location and is predominantly arid or semiarid, with hot and dry summers and cold winters. This country, with its diverse habitats ranging from wetlands and forests to mountains and deserts, provides a hospitable environment for various bird species (1). *Trichomonas gallinae* is an avian protozoan parasite that commonly infects birds, particularly pigeons and doves (2-4). This protozoan parasite is responsible for causing a contagious disease known as trichomoniasis or "canker" in birds (5). These birds are frequently identified as natural carriers of *T. gallinae*, serving as a reservoir for the parasite. Several raptor species, including hawks, eagles, and falcons, have been reported to be affected by this parasite (6-8). Waterbirds, such as ducks, swans, and geese, have also been found to carry *T. gallinae*. Additionally, passerine birds, such as finches, sparrows, and songbirds, have been documented as hosts for *T. gallinae* (9, 10). *T. gallinae* thrives in the upper gastrointestinal tract, including the crop and throat of infected birds, leading to various symptoms that can range from mild discomfort to severe illness and even death. Understanding the biology, transmission, and impact of *T. gallinae* is crucial for effective disease prevention and management in bird populations. Numerous bird species have been reported to be infected with *T. gallinae*, making it a significant concern for avian health and conservation efforts worldwide (11). The present review of studies conducted between 2008 and 2023 aimed to assess the presence of *T. gallinae* in Iran.

2. Prevalence of *Trichomonas galinae* infections in avian in Iran

In 2008, a study was conducted in Iran to expand the understanding of *T. gallinae* in pigeons (12). Following that, numerous studies investigated the presence of *T. gallinae* infection in birds from various areas of Iran (Table 1). From 2008 until now, domestic pigeons, zebra finches, and turkeys from Iran were examined using methods to detect trophozoites and cysts. The findings of these studies are presented in Table 1. The comparison of prevalence rates of trichomoniasis between turkey, Zebra Finches, and pigeons in Iran indicates that pigeons play a more significant role in sustaining the cycle in the mentioned area than other bird species. Thease finding was incontinent with the same previous study (13). According to Table 1, the occurrence of trichomoniasis was more common in regions with dry weather compared to areas with high levels of precipitation in Iran. This finding reinforces the hypothesis that dry weather and limited rainfall have been proposed as potential factors contributing to the rise of this disease (14). The present review study, which included research conducted over the last 15 years, performed an analysis of the presence of *T. gallinae* infection in more than 29% of Iranian territory (9 out of 31 counties). Infected avians were found in all studied areas during this period. As the number of examined animals and the detection methods varied drastically among the different studies, the comparative contribution of different host species to the parasite's maintenance is difficult to assess.

3. Pathological lesion of *Trichomonas gallinae*

In some studies conducted on the progression of trichomoniasis in pigeons from Iran, no significant lesions and evident clinical symptoms caused by the disease were identified (12, 15). In another study conducted in the same region, researchers observed visible yellowish-white masses of caseous necrotic material in the mouths, throats, food storage organs, and stomachs of infected pigeons and turkeys. Additionally, there was also hyperplasia of mucous cells in the epithelia of the trachea. The lungs exhibited significant congestion (16). In contrast to previous studies conducted in other parts of the world (12), the invasion of the mucosal lesion to the sinuses of the skull and penetrating eyes and brain was not reported.

4. Conclusion

The present review showed that the *T. gallinae* infection rate is relatively high among the Iranian avian population. The *T. gallinae* infection is still significantly present in Iran, infecting several wild and domestic avian species with different prevalence rates over the years, thus maintaining the focus on the parasites. Using at least two techniques, such as culture or PCR, in addition to direct smear is recommended for better diagnosis of infection and understanding the actual prevalence of *T. gallinae.*

Table 1. Prevalence of Trichomonas galinae infections in avian in Iran

Animal species	year	Location	Number of animal	methods	Prevalence (%)	references
Domestic pigeons	2018	West Azerbaijan	560	Staining	53	(17)
domestic pigeons	2023	Alborz	87	Culture and PCR	32	(18)
pigeons	2011	Khorasan	418	Wet smear	37	(16)
Zebra Finches	2015	Tehran	80	Wet smear	2.5	(19)
Turkey	2016	Sistan	45	Staining	20	(20)
pigeons	2016	Sistan	35	Staining	65.7	(20)
pigeons	2011	Isfahan	100	Staining	57	(15)
pigeons	2008	Yazd	418	Staining	70	(12)
domestic pigeons	2011	South khorasan	102	Staining	57.8	(21)
pigeons	2016	Urmia	72	Staining and PCR	33.3	(22)

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Not Applicable

Authors' Contribution
BSh developed the original idea and the protocol, abstracted and analyzed data, wrote the manuscript, and is a guarantor. AE, NT, and ZM contributed to the development of the protocol, abstracted data, and prepared the manuscript.

Ethics
The present study was approved by the Ethics Committee of Science and Research Branch University, Islamic Azad University, Tehran, Iran

Conflict of Interest
We declare that there was no conflict of interest regarding the publication of this paper.

Data Availability
The data that support the findings of this study are available on request from the corresponding author.

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