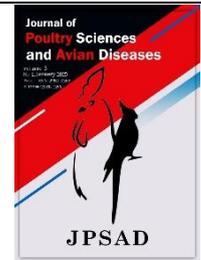


Journal of Poultry Sciences and Avian Diseases

Journal homepage: www.jpsad.com



The Occurrence and Impact of Red Mite (*Dermanyssus gallinae*) Infestations in Budgerigars (*Melopsittacus undulatus*) in Kashan (Central Parts of Iran)

Nasser. Hajipour¹  Mohammadreza. Ghorani^{2*}  Mohsen. Ghorbani³ , Amir Ali. Shahbazfar² 

¹ Department of Food Hygiene and Aquatic, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

² Department of Pathobiology, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

³ Poultry Health and Disease Specialist, Avian Clinic, Kashan, Iran

* Corresponding author email address: mo_gh66@yahoo.com

Article Info

Article type:

Original Research

How to cite this article:

Hajipour, N., Ghorani, M., Ghorbani, M., & Shahbazfar, A. A. (2025). The Occurrence and Impact of Red Mite (*Dermanyssus gallinae*) Infestations in Budgerigars (*Melopsittacus undulatus*) in Kashan (Central Parts of Iran). *Journal of Poultry Sciences and Avian Diseases*, 3(1), 84-88. <http://dx.doi.org/10.61838/kman.jpsad.3.1.8>



© 2025 the authors. Published by SANA Institute for Avian Health and Diseases Research, Tehran, Iran. This is an open access article under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License.

ABSTRACT

The red mite of poultry, *Dermanyssus gallinae*, is the most significant blood-sucking ectoparasite affecting birds. This study aimed to document the infestation of *Dermanyssus gallinae* in budgerigars (*Melopsittacus undulatus*) and examine its pathological effects in Kashan (central Iran). Samples were taken from 150 birds, with skin samples fixed in 10% buffered formalin and histological sections prepared using standard Hematoxylin & Eosin staining techniques. The results indicated that 120 out of 150 budgerigars (80%) were infested with at least one mite, and *Dermanyssus gallinae* was found in most of the sampled nests. Pathological findings included hyperplastic epidermis, heterophilic inflammation of the skin, and severe hemorrhage in the dermis. The mite can be transmitted from budgerigars to other poultry and humans. In order to control the mite population while minimizing the harmful effects of acaricides on birds, it is recommended to spray acaricides twice a year, before and after nesting.

Keywords: *Budgerigar*, *Dermanyssus gallinae*, *infestation*, *Histopathology*, *Poultry parasites*

1 Introduction

Budgerigars, often called budgies or parakeets, are among the most popular pet birds due to their friendly nature, small size, and vibrant plumage. These sociable birds

are known for their playful personalities and ability to mimic sounds and speech, making them entertaining companions. Budgies are relatively low-maintenance, requiring a clean cage, fresh food, water, and daily interaction to stay happy and healthy. They thrive on mental stimulation, so toys, mirrors,

Article history:

Received 02 September 2024

Revised 06 November 2024

Accepted 16 November 2024

Published online 01 January 2025

and time outside the cage for exercise are essential. With proper care, budgerigars can live up to 10 years or more, forming strong bonds with their owners. Birds are hosts to various parasites, including ectoparasites (1). The primary ectoparasite plaguing poultry is *Dermanyssus gallinae*, commonly called the "red mite" by poultry farmers. This parasite significantly affects animal health, serves as a vector for various viruses and bacteria, and impacts specifically egg-laying birds across numerous countries (2, 3). The life cycle of the red mite (*Dermanyssus gallinae*) includes five stages: egg, larva, protonymph, deutonymph, and adult. Eggs hatch in 2–3 days, leading to a non-feeding larva. The larva molts into a protonymph, feeding the host's blood. It then develops into a deutonymph, another feeding stage, before becoming an adult. Adults feed mainly at night and lay eggs after blood meals. The cycle can be completed in 7–10 days, and adults can survive months without feeding. *D. gallinae* poses a significant challenge because it is a parasite that feeds on blood and must do so to survive, reproducing quickly. It targets various species like poultry, game birds, and wild birds. Moreover, dermatitis caused by *D. gallinae* has been sporadically documented in mammals globally, including Iran

(4-6). Control red mites using insecticides like permethrin, natural remedies like neem oil, and regular coop cleaning with heat treatments. Additionally, predatory mites and frequent monitoring help manage infestations. Control red mites using insecticides like permethrin, natural remedies like neem oil, and regular coop cleaning with heat treatments. Additionally, predatory mites and frequent monitoring help manage infestations. The aim of this study was to estimate the frequency of the red mite (*D. gallinae*) in budgerigars and assess its potential pathological impacts.

2 Materials and methods

2.1 History

Two hundred pairs of budgerigars were kept in a breeding flock. Four to seven chicks and two to three parent birds were dead daily. Mortality cases among budgerigar chicks (5 to 14 days old) (Figure 1) were reported from a farm in Kashan, Isfahan province. Mortality rates were lower in parent birds (8 – 12 months old). Most of the birds were infested and exhibited signs of nervousness. The birds had no other clinical symptoms.

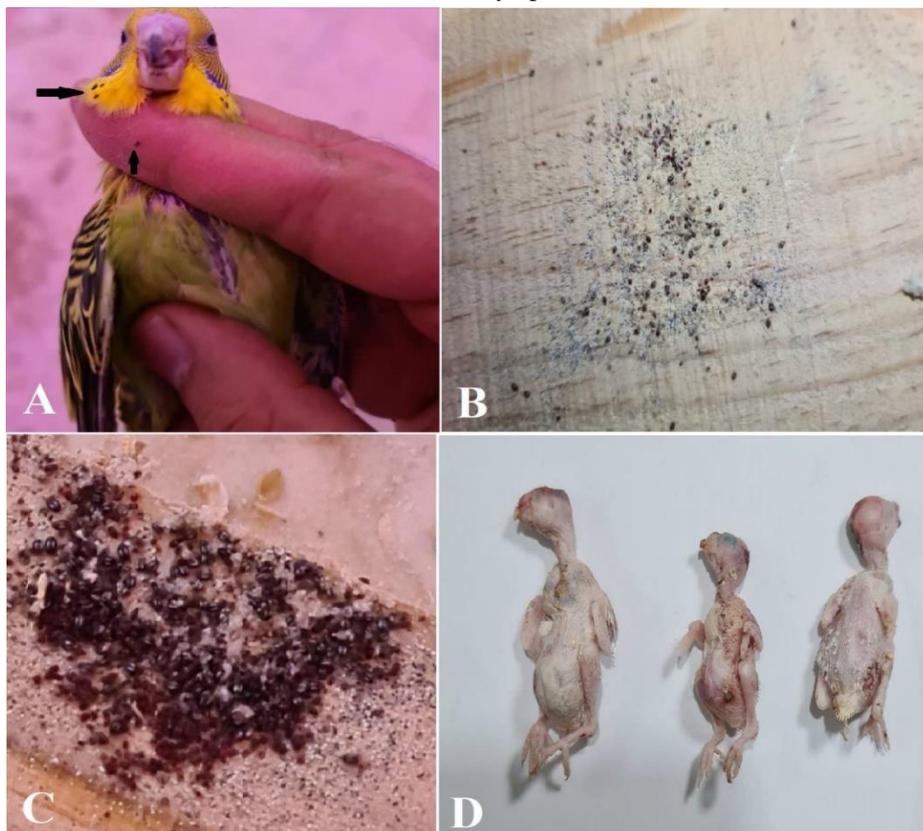


Figure 1. Budgerigars (*Melopsittacus undulatus*) infested with *Dermanyssus gallinae* (A), Larval and adult stages of the parasite in the nest (B and C), Feather shedding and bleeding caused by *Dermanyssus gallinae* (D)

2.2 Sampling

A large number of red mites were found on the birds' bodies and in their nests and cages (Figure 1). Samples, including feathers and nest materials, were collected from 150 birds. The samples were carefully packed into plastic bags and submitted to the Parasitology Laboratory at the Faculty of Veterinary Medicine, University of Tabriz, Iran, for detailed analysis.

2.3 Parasitological Investigations

The samples were washed into a petri dish and scrutinized under a dissecting microscope to identify mite specimens. Ectoparasites were then preserved in 70% ethanol, treated with lactophenol for clarity, and affixed onto microscope slides using Canada balsam (7).

2.4 Histopathological Examination

One hundred and fifty skin tissue samples were taken from the birds and preserved in 10% formalin for histopathological evaluation. These samples were subsequently stained with hematoxylin and eosin in the laboratory and examined under a light microscope.

3 Results

Out of the 150 analyzed samples, 120 (80%) were infested with mites. No other ectoparasites were found in the examined samples. The mites were distinguished based on their morphological features utilizing fundamental identification techniques outlined by Soulsby (1982) and Wall and Shearer (2008) (8, 9) (Figure 2). Following clearance in lactophenol, *Dermanyssus gallinae* exhibited the anus (marked by a black arrow) situated on the rear section of the anal plate ($\times 100$ magnification).



Figure 2. *Dermanyssus gallinae* isolated from infested birds ($\times 40$)

Histopathological analysis of sections displayed a thickened epidermis, increased keratinization, inflammation

characterized by accumulation of heterophils in the skin, and extensive hemorrhage in the dermis (Figure 3).

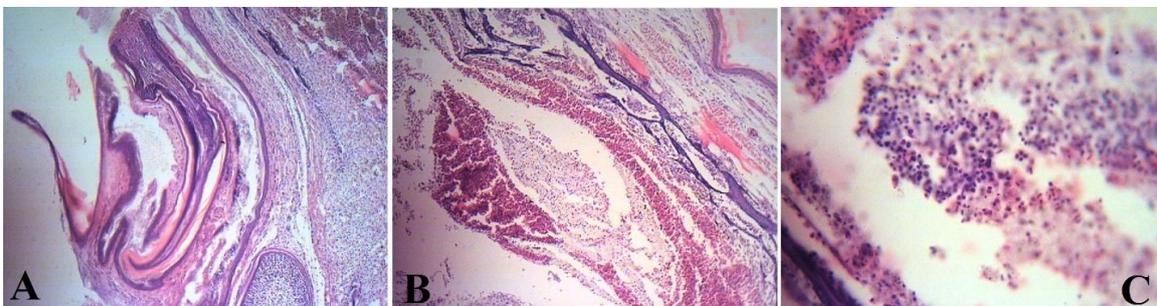


Figure 3. A: Hyperplastic epidermis and hyperkeratosis due to severe irritation in the skin (H&E, $\times 200$); B: Severe hemorrhage in the dermis (H&E, $\times 200$); C: Heterophilic inflammation in the derm (H&E, $\times 800$)

4 Discussion

Dermanyssus gallinae, commonly called the poultry red mite, is a nocturnal parasite that feeds on blood, causing considerable harm by inducing blood loss. This can result in high mortality rates among newborn chicks and, in some cases, among hens (10). *D. gallinae* is recognized as a vector for zoonotic pathogens (11) and a significant ectoparasitic threat to poultry. *D. gallinae* has been linked to the spread of *Salmonella* spp. in mite-infested poultry farms in Kosovo (3) and has been observed in barn swallow nests in Urmia, Northwest Iran (6). The initial case of dermatitis in a horse related to *D. gallinae* was recorded by Mignon and Losson (2008) in a 16-year-old horse that had been in contact with domestic hens. Furthermore, transmission to humans has been noted, causing skin lesions and a pruritic dermatological syndrome (12-14).

D. gallinae primarily inhabits the environment rather than residing on the host for most of its life cycle, preferring confined spaces such as perches and feeding bowls. It feeds on its hosts sporadically, akin to the behavior of mosquitoes or bed bugs (5, 15). The presence of this mite is widespread in poultry settings worldwide, occurring in various types of housing systems. However, its prevalence is notably higher in backyard flocks and free-range setups (16). Mites congregate in hen nests, crevices of perches, and litter, which provides easy access for birds. Studies have shown that *D. gallinae* spreads from one or a few original areas throughout the poultry house (17). Researchers examined the ectoparasites affecting 555 budgerigars and 121 canaries in Burdur City, Turkey. As a result, no ectoparasite species were identified on the feathers or body parts of the 676 caged birds. However, many *Dermanyssus gallinae* were discovered in the cages and their equipment, with detection rates of 28.65% in budgerigar cages and 28.57% in canary cages (18). In May 2022, scientists visited a private budgerigar hatchery and collected mites from the bodies of the birds and their nests. The morphological features of the mites were confirmed through scanning electron microscopy in Yucatan, Mexico (19).

In the current study, *D. gallinae* was found in 120 (80%) out of 150 budgerigars. Histopathological findings included hyperplastic epidermis, hyperkeratosis, heterophilic inflammation in the skin, and severe hemorrhage in the dermis. These findings align with studies conducted by Hobbenaghi *et al.* (2012) and Sokół and Rotkiewicz (2010), which documented lymphocytic infiltration and necrosis of feather follicles in poultry skin infested with *D. gallinae* (20,

21). Mites can damage subcutaneous vessels during feeding, resulting in vascular thrombosis and disruptions in subcutaneous blood flow. These circulatory disturbances may account for pathological alterations observed in feather follicles, such as hydropic degeneration and necrosis. While the extensive vascular network in the subcutis typically prevents extensive visible necrosis in the dermis, it can induce limited degeneration and necrosis in delicate growing organs like follicles (20).

5 Conclusion

These findings suggest that *D. gallinae* can transfer between the poultry population and budgerigars, as indicated by its occurrence in most samples. Considering the potential of transmission to other birds and humans through budgerigars and their nests, applying acaricides can effectively reduce the mite population. It is recommended to employ acaricide spraying before and after nesting periods to mitigate the negative impacts of acaricides on these birds, along with applying proper cleaning and disinfection measures. Controlling red mite infestations is challenging due to their ability to hide in small cracks and crevices, making it difficult to reach them with treatments. Additionally, red mites can develop resistance to chemical insecticides, reproduce rapidly, and survive for months without feeding, allowing infestations to persist or reoccur even after control efforts. Routine measures include regular cleaning, insecticide application, and the use of diatomaceous earth to control red mite infestations. Monitoring, heat treatments, integrated pest management, biosecurity practices, and introducing predatory mites also contribute to effective management.

Acknowledgements

None.

Conflict of Interest

The authors have no conflict of interest to declare.

Author Contributions

NH, MRGh. Methodology, Writing, Review & Editing. MRGh Conceptualization, Writing, Original draft, & Editing. MGh Investigation. NH, AASh Methodology.

Data Availability Statement

The data produced and examined during this study are not openly accessible but can be obtained from the corresponding author upon a reasonable request.

Ethical Considerations

Not applicable.

Funding

No funding was received to assist with the preparation of this manuscript.

References

1. Hinkle NC, Corrigan RM. External parasites and poultry pests. *Diseases of Poultry* 2020. p. 1135-56 [DOI]
2. Bartley K, Wright HW, Bull RS, Huntley JF, Nisbet AJ. Characterization of *Dermanyssus gallinae* glutathione S-transferases and their potential as acaricide detoxification proteins. *Parasites & Vectors*. 2015;8:350. [PMID: 26112960] [PMCID: PMC4491418] [DOI]
3. Hamidi A, Sherifi K, Muji S, Behluli B, Latifi F, Robaj A, et al. *Dermanyssus gallinae* in layer farms in Kosovo: a high risk for *Salmonella* prevalence. *Parasites & Vectors*. 2011;4(1):136. [PMID: 21762497] [PMCID: PMC3199856] [DOI]
4. Abdigoudarzi M, Mirafzali MS, Belgheiszadeh H. Human Infestation with *Dermanyssus gallinae* (Acari: Dermanyssidae) in a Family Referred with Pruritus and Skin Lesions. *Journal of Arthropod Borne Diseases*. 2014;8(1):119-23.
5. Gavrilovic P, Kecman V, Jovanovic M. Diagnosis of skin lesions caused by *Dermanyssus gallinae* in five patients. *International Journal of Dermatology*. 2015;54(2):207-10. [PMID: 23968586] [DOI]
6. Mohamadi Ghalehjoughi E, Tavassoli M, Naem S. *Dermanyssus gallinae* (Acari, Mesostigmata) in the Barn Swallow (*Hirundo rustica*) nests in Urmia suburb, North West of Iran. *Persian Journal of Acarology*. 2017;6(2):95-102.
7. Mirzaei M, Ghashghaei O, Yakhchali M. Prevalence of Ectoparasites of Indigenous Chickens From Dalahu Region, Kermanshah Province, Iran. *Turkiye Parazitoloj Derg*. 2016;40(1):13-6. [PMID: 27222329] [DOI]
8. Soulsby EJJ. *Helminths, arthropods, and protozoa of domesticated animals*. Philadelphia: Lea and Febiger; 1982.
9. Wall R, Shearer D. *Veterinary Ectoparasites: Biology, Pathology and Control*. Hoboken: John Wiley & Sons; 2008.
10. Wojcik AR, Grygon-Frankiewicz B, Zbikowska E, Wasielewski L. Invasion of *Dermanyssus gallinae* (De Geer, 1778) in poultry farms in the Toruń region. *Wiadomości Parazytologiczne*. 2000;46(4):511-5.
11. Circella E, Pugliese N, Todisco G, Cafiero MA, Sparagano OAE, Camarda A. Chlamydia psittaci infection in canaries heavily infested by *Dermanyssus gallinae*. *Experimental and Applied Acarology*. 2011;55(4):329-36. [PMID: 21761223] [DOI]
12. Cafiero MA, Galante D, Camarda A, Giangaspero A, Sparagano O. Why dermanysiosis should be listed as an occupational hazard. *Occupational and Environmental Medicine*. 2011;68(8):628. [PMID: 21486993] [DOI]
13. Dogramaci AC, Culha G, Ozcelik S. *Dermanyssus gallinae* infestation: an unusual cause of scalp pruritus treated with permethrin shampoo. *Journal of Dermatological Treatment*. 2010;21(5):319-21. [PMID: 20687864] [DOI]
14. Haag-Wackernagel D, Bircher AJ. Ectoparasites from feral pigeons affect humans. *Dermatology*. 2010;220(1):82-92. [PMID: 20016127] [DOI]
15. Collgros H, Iglesias Sancho M, Aldunce MJ, Expósito Serrano V, Fischer C, Lamas N, et al. *Dermanyssus gallinae* (chicken mite): an underdiagnosed environmental infestation. *Clinical Dermatology*. 2013;38(4):374-7. [PMID: 23530520] [DOI]
16. Sparagano O, Pavličević A, Murano T, Camarda A, Sahibi H, Kilpinen O, et al. Prevalence and key figures for the poultry red mite *Dermanyssus gallinae* infections in poultry farm systems. *Control of Poultry Mites (Dermanyssus)* 2009. p. 3-10 [DOI]
17. Nordenfors H, Hoglund J. Long term dynamics of *Dermanyssus gallinae* in relation to mite control measures in aviary systems for layers. *British Poultry Science*. 2000;41(5):533-40. [PMID: 11201430] [DOI]
18. Yıldız Ö, Köse O. Investigation of ectoparasites in budgerigar and canaries in Burdur city of Turkey. *Veterinary Journal of Mehmet Akif Ersoy University*. 2023;8(2):89-94. [DOI]
19. Garcia-Rejon JE, Cab-Cauch IY, Tzuc-Dzul JC, Cigarroa-Toledo N, Chi-Chim WA, Chan-Perez JI, et al. Mites associated with budgerigars *Melopsittacus undulatus* (Psittaciformes: Psittacidae) and the first report of *Ornithonyssus bursa* (Mesostigmata: Macronyssidae) in Mexico. *Open Veterinary Journal*. 2023;13(1):20-5. [PMID: 36777438] [PMCID: PMC9897498] [DOI]
20. Hobbenaghi R, Tavassoli M, Alimehr M, Shokrpour S, Ghorbanzadegan M. Histopathological study of the mite biting (*Dermanyssus gallinae*) in poultry skin. *Veterinary Research Forum*. 2012;3(3):205-8.
21. Sokół R, Rotkiewicz T. Histopathological changes of the skin in hens infested with *Dermanyssus gallinae*. *Polish Journal of Veterinary Science*. 2010;13(2):385-7.