

Detection of Blood Parasites in Different Pet Birds in Erbil City**Waad Khalid Khalaf**

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Abstract

The current study was conducted to find out the different species of blood parasites that infect pet birds (*Melopsittacus undulatus*, *Carduelis chloris* and *Carduelis carduelis*) and to know the infection rates with these parasites and their relationship with the sex of the bird, by examining (62) blood samples collected from three species of different pet birds in the Erbil city, of both sexes, during October 2019 to July 2021. The current study showed that pet birds were infected with Haemosporidian parasites with a total percentage of 35.48%, and the highest percentage was in the Eurasian goldfinch (*Carduelis carduelis*) with 41.17%, followed by the greenfinch (*Carduelis chloris*) with 31.25%, and the lowest rate was in the budgerigar (*Melopsittacus undulatus*) by 25%. Also, the study showed that the infection rate of *Plasmodium* spp. and *Haemoproteus* spp. was 77.27%, and 45.45% respectively. It was noted that there were no significant differences in the infection rates with blood parasites between males and females. While significant differences were recorded in the infection rates with species of blood parasites according to different types of infection, as the single infection recorded the highest infection rate of 77.27%, while the double infection was lower with a rate of 22.72%.

Keywords: Blood parasites, Pet birds, Haemoproteus, Plasmodium, Erbil

الكشف عن طفيليات الدم في طيور الزينة المختلفة في مدينة أربيل**الخلاصة**

الدراسة الحالية أجريت لمعرفة الأنواع المختلفة من طفيليات الدم التي تصيب طيور الزينة (البادجي، الحسون الأخضر والحسون الاوراسي) ومعرفة نسب الاصابة بهذه الطفيليات وعلاقتها مع جنس الطائر، وذلك من خلال فحص (62) عينة دم تم جمعها من ثلاثة أنواع من طيور الزينة المختلفة في مدينة أربيل ومن كلا الجنسين خلال الفترة من شهر تشرين الأول 2019 ولغاية شهر تموز 2021، أظهرت الدراسة الحالية اصابة طيور الزينة بطفيليات الدم بنسبة اصابة كلية بلغت 35.48% وكانت أعلى نسبة في الحسون الاوراسي *Carduelis carduelis* بنسبة 41.17%، تلتها الحسون الأخضر *Carduelis chloris* بنسبة 31.25%، وكانت أدنى نسبة اصابة في طيور البادجي *Melopsittacus undulatus* بنسبة 25%، وبينت الدراسة الحالية اصابة طيور الزينة بطفيلي *Plasmodium* spp. بنسبة 77.27% والطفيلي *Haemoproteus* spp. بنسبة 45.45%.

ولوحظ انعدام الفروقات المعنوية في نسب الاصابة بطفيليات الدم بين الذكور والإناث. في حين سجلت فروقات معنوية في نسب الاصابة بأنواع طفيليات الدم باختلاف أنماط الاصابة، إذ سجلت الاصابة المنفردة أعلى نسبة اصابة بلغت 77.27%، في حين كانت الاصابة المزدوجة أقل وبنسبة بلغت 22.72%.

Introduction

Pet birds with bright colors and a sweet voice are used to get rid of boredom, treat psychological and nervous diseases, spread fun, joy and pleasure in their places of existence, and enjoy observing and studying them and identifying the means of raising them (1). Pet birds are very important to our public health because they may act as natural reservoir hosts for many pathogens, such as internal and external parasites, some viral diseases, and some other pathogens (2,3,4,5). Different types of birds, including pet birds, can be reservoir hosts for many infectious diseases that may have a significant impact on humans and various animals (6). These hosts are capable of transmitting many pathogens (*Plasmodium*, *Haemoproteus*, *Leucocytozoon*) and many other diseases (7). Blood parasites are capable of parasitizing different species of birds worldwide, and have the ability to develop and complete its life cycles in many bird types belong to different families (8, 9, 10). *Plasmodium* species in birds utilize mosquitoes (Culicidae) belonging to different genera (*Aedes*, *Anopheles*, *Culex*) to complete life and transmission cycles (11). The life cycle of blood parasites is very complex and includes stages occurring within blood-sucking vectors and stages occurring in blood cells and tissues of vertebral hosts (12). Blood parasites have a significant impact on their hosts of birds, as they cause tissue damage and affect production, reproduction and body growth, and when severe infection is the cause of the death of birds when not treated (13,14,15). The presence

of blood parasites is widespread all over the world due to the large role that insects play in transmitting infection (16). Many researchers indicated the presence of different species of blood parasites that infect different types of pet birds, (17) indicated that pigeons were infected with blood parasites in the Ramadi city, at a rate of 32.14%, (18) indicated infecting sparrows in the Baghdad region with seven species of blood parasites belonging to (*Plasmodium*, *Haemoproteus*, and *Leucocytozoon*). (19) recorded infection of pigeons with different species of blood parasites (*Leucocytozoon marchouxi*, *Haemoproteus columbae*, *Plasmodium gallinacium*) in the Mosul city. The aim of this study to achieve the following objectives: Diagnosing the different blood parasites that infect pet birds in the Erbil city, investigate infection rates of blood parasites in pet birds and their relationship with the sex of the bird.

Material and Methods

Sixty-two birds were collected from the markets of the city of Erbil, of both sexes, during the period from October 2019 to July 2021. The birds included three species: 12 budgies (*Melopsittacus undulatus*), 16 greenfinches (*Carduelis chloris*), 34 Eurasian goldfinches (*Carduelis carduelis*).

Blood samples were collected directly from the wing vein (Brachial vein) of the birds, thin blood smears were prepared and left for 10 minutes to dry, then fixed with methyl absolute

alcohol for 3 minutes, then the smears were stained with Giemsa stain 3% for 50 minutes, then washed with buffer solution and left to dry, then it was examined with a light microscope with X100 oil and at 100 microscopic fields for each sample (20).

Statistical analysis

The results obtained using SPSS were analyzed using Chi-square at a significance level of ($p < 0.05$), (21).

Results and Discussion

The results showed that the total rate of infection with blood parasites in pet birds in Erbil city was 35.48%, Table (1). The results showed the highest infection rate with blood parasites in pet birds was in the Eurasian goldfinch (*Carduelis carduelis*) 41.17%, followed by the greenfinch (*Carduelis chloris*) 31.25%, and the lowest rate was in the budgerigar (*Melopsittacus undulatus*) 25%, Table (2). The results showed infected of pet birds with *Plasmodium* spp., *Haemoproteus* spp. at rates of 77.27% and 45.45%, respectively, Table (3), figure (1).

Table (1): The total rate of infection with blood parasites in pet birds in the Erbil city

No. examined	Infected birds	% Infection
62	22	35.48

Table (2): Numbers and infection rates with blood parasites in pet birds according to the species of bird

Species of bird	No. examined	Infected birds	% Infection
<i>Melopsittacus undulatus</i>	12	3	25.00
<i>Carduelis chloris</i>	16	5	31.25
<i>Carduelis carduelis</i>	34	14	41.17
Total	62	22	35.48

Table (3): Infection rate of *Plasmodium* spp., *Haemoproteus* spp. in 22 infected pet birds

Parasite species	Infected birds	% Infection
<i>Plasmodium</i> spp.	17	77.27
<i>Haemoproteus</i> spp.	10	45.45

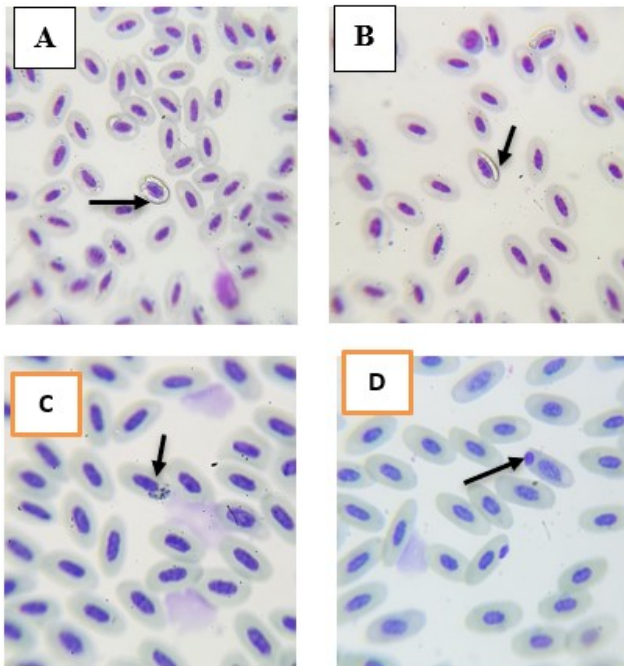


Figure (1): Evolutive forms of haemospridian in Giemsa-stained blood smears from pet birds at Erbil, Iraq. The arrows show in (A) macrogametocyte of *Haemoproteus* spp., in (B) microgametocyte of *Haemoproteus* spp., in (C) schizont of *Plasmodium* spp., and (D) trophozoite of *Plasmodium* spp. 1000x.

Regarding the gender of the bird, the study showed the infection rate of blood parasites in males was 42.42% of the 33 total males examined, while in females, the infection rate was 27.58% of the 29 total females examined, there were no significant differences in the infection rates for males and females, table (4).

Table (4): Numbers and infection rates with blood parasites in pet birds according to the sex of the bird

Sex of birds	No. examined	Infected birds	% Infection
Males	33	14	42.42a
Females	29	8	27.58a
Total	62	22	35.48

Similar letters indicate that there is no significant difference at the level of ($P < 0.05$).

The study revealed significant differences in the infection rates with species of blood parasites according to different types of infection, the single infection was the highest 77.27%, while the double infection was 22.72%, Table (5).

Table (5): Infection rates with blood parasites in pet birds according to different types of infection

Types of infection	Infected birds	% Infection
Single infection	17	77.27a
Double infection	5	22.72b
Total	22	35.48

Different letters indicate a significant difference at the level of ($P < 0.05$).

The current study showed the infection of pet birds (budgies, greenfinch and Eurasian goldfinch) with blood parasites *Plasmodium* spp., *Haemoproteus* spp. The total infection rate was 35.48%. This percentage is low compared to (15), who recorded the infection of passerine birds with blood parasites at a rate of 52% in southern Spain, and (22) recorded the infection of domestic pigeons in the Sulaymaniyah city with blood

parasites with a total percentage 55.72%, and (23) recorded that pet birds and passerine birds were infected with blood parasites, with a total rate of 58.04% in Bulgaria. The results were in agreement with (24), as they recorded the infection rate of different types of birds with *Haemoproteus* 33.5% in the Qadisiya city, (6) recorded the infection of passerine birds in eastern Iran with *Haemoproteus*, with a rate of 37.5%. The reason for the difference in the infection rates may be due to the different environmental conditions and the difference in the numbers and types of birds examined. The current study revealed that different types of pet birds were infected with blood parasites, the highest rate of infection was in the Eurasian goldfinch (*Carduelis carduelis*) 41.17%, followed by the greenfinch (*Carduelis chloris*) 31.25%. The results of this study were higher than (25), where they indicated that the greenfinch (*Carduelis chloris*) was infected with blood parasites at a rate of 19.9%. The lowest rate of infection was in budgerigars (*Melopsittacus undulatus*) by 25%, and these results were close to (26), where they recorded the infection of budgerigar (*Melopsittacus undulatus*) 30%. The study showed that the highest infection rate was with *Plasmodium* spp. 77.27%. The results were higher than (22,20,27) where they recorded infection rates with *Plasmodium* spp. (46%, 26.92%, 15.1%), respectively. (23) also recorded the infection of pet birds with *Plasmodium* spp., 43%. The high prevalence of recorded *Plasmodium* spp. in our study may be due to high

prevalence of *Plasmodium* vector (*Culex* mosquitoes) in the area, in which they are not host specific and more active at night. The study also showed that pet birds were infected with *Haemoproteus* spp. 45.45%, and the results were higher than (27,28,20, 29) when they recorded infection with *Haemoproteus* spp. at rates of (13.2%, 12%, 10.48%, 32.6%), respectively. And the results were lower than (15,30), who recorded a rate of infection with *Haemoproteus* spp. 90% and 76%, respectively. The differences in the infection rate with blood parasites in the different studies may be due to many factors that affect the occurrence of the disease such as the types of birds examined, the host sensitivity and resistance, feeding habits, environmental conditions, geographical area and housing conditions (30).

when considering the sex factor and its relationship with the infection rate with blood parasites, excluding other factors, the results did not record a significant difference in the infection rates with blood parasites between males and females in pet birds. These results are in agreement with many previous studies, (28,31,32) indicated that there was no significant difference in the infection rates with different species of blood parasites between males and females.

The study also showed significant differences between the infection rates with different species of blood parasites in different types of infection, the single infection was the

highest 77.27%, while the double infection was lower with an infection rate of 22.72%. These results were consistent with (20), when they indicated the highest with the single infection.

Conclusions

Infection of pet birds (budgie, greenfinch and Eurasian goldfinch) with *Haemoproteus* spp. and *Plasmodium* spp.

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Conflict of interest

The author declare that there are no conflicts of interest regarding the publication of this manuscript.

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