

Prevalence of Haemosporidian parasites of Chukar Partridge Birds in Sulaimani Province/Kurdistan Region of Iraq

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Abstract

This study was carried out in Sulaimani Province, Kurdistan region, Iraq during the period from April 2016 to the end of September 2016. A total of 100 chukar partridge of different ages were randomly captured alive and their blood smear were examined microscopically using Giemsa stain. The results of the study indicated that 60 (60%) were infected with blood parasite. The prevalence of infection by *Plasmodium* spp. was highest 46 (46%), while infections with *Haemoproteus* spp. Were 12(12%). Also, a mixed infection was found with *Plasmodium* spp. and *Haemoproteus* spp. in two samples only. It was concluded that the partridges are susceptible to *Haemosporidian* and *Plasmodium* parasites. The current study was reported for the first time the existence of *Plasmodium* spp. and *Haemoproteus* spp. in Kurdistan region of Iraq.

Keywords: *Haemoproteus*, *Plasmodium*, Chukar birds, Sulaimani.

انتشار طفيليات الدم في طيور الحجل في محافظة السليمانية / إقليم كردستان / العراق

الخلاصة

أجريت هذه الدراسة في محافظة السليمانية / إقليم كردستان / العراق خلال الفترة من أبريل 2016 إلى نهاية سبتمبر 2016. تم اصطياد بشكل عشوائي مائة من الحجل أحياء من أعمار مختلفة وفحصت مسحات دموية من الحجل بالمجهر باستخدام صبغة كيمزا. أشارت نتائج الدراسة إلى أن 60 (60%) مصابون بطفيلي الدم. كانت معدل انتشار الإصابة بطفيلي *Plasmodium* spp. الأعلى 46 (46%) وفي حين أن نسبة الإصابة بطفيلي *Haemoproteus* spp. كانت 12 (12%). وأيضا تم العثور على إصابة مختلطة مع كل من *Plasmodium* spp. و *Haemoproteus* spp. في عينتين فقط. تم استنتاج إلى أن الحجل عرضة للإصابة بطفيلي الدم *Plasmodium* و *Haemoproteus*. وان الدراسة الحالية هي الأولى عن تسجيل وجود الطفيليين *Plasmodium* و *Haemoproteus* spp. في إقليم كردستان / العراق.

Introduction

Haemosporidian parasites are vector-borne parasites in the Phylum Apicomplexa

and belonging to the Order *Haemosporidia* that are commonly found in reptiles, birds and mammals. Avian *Haemosporidian* parasites are taxonomically diverse and cosmopolitan in

distribution, especially in warm and temperate climate (1, 2, 3, 4, 5, 6). Also, they are intracellular protozoa found within the blood cells and tissues of their avian hosts belonging to the genera *Plasmodium*, and *Haemoproteus*(5, 7, 8). They are found in several organs, including heart, lung, liver, spleen, kidney, brain, gizzard and intestine in most cases and in some also skeletal muscle and bursa of Fabricius (9). The sporozoite that is available in the salivary glands of the insect vector is considered as an infective stage (10). Interactions of the blood parasite have been the topic of many ecological and evolutionary documents (11-19). However, enough data about prevalence and distribution of avian Haematozoa from many regions of the world is not available, especially from the Middle East (20, 21). In Iraq, only a few surveys have been conducted to cover the information of bird parasites. The red-legged partridge (*Alectoris Chukar*) is a non-migratory bird found mainly in the North part of Iraq (Kurdistan region). It is the most important bird in this region they had been used for eating, singing and as game birds. Thus, in this current work, we aimed to investigate and examine wild birds for Haematozoa parasite intensively.

Materials and Methods

Animals of the Study

A total of 100 apparently healthy chukar partridge birds (Fig.1) of different ages were randomly captured alive, kept in cages, and marked with serially numbered bands to avoid multiple sampling between periods from April 2016 to the end of September 2016 in three different localities of the Sulaimaniyah Province/Kurdistan Region, Northern Iraq which includes Darbandixan, Qaradax and Bamo (Fig. 2).

Sampling

After the wing vein (brachial vein) was cleaned with 70% ethyl alcohol, approximately, 1.0 mL of blood was collected for each sample provided with two blood smears for morphologic identification of haemoparasites. Blood films were air-dried within 5–10 min, fixed in absolute methanol for 5 minutes and then stained with Giemsa(3%) working solution from for 50 min, then the excess stain was washed off with buffered water and left to dry. Blood films were examined under oil immersion (100×), counting smaller Haematozoa in 100 microscopic fields (24, 25).

Results and Discussion

A total of 200 thin blood smears, from 100 partridges (two blood smear for each bird), were examined, and 60 (60%) were infected by at least one blood parasite. The prevalence of infection by *Plasmodium* spp. was highest 46 (46%), and *Haemoproteus* spp. was 12 (12%) for each one of them. Also, a mixed infection was found with *Plasmodium* spp. and *Haemoproteus* spp. in one sample only 2 (2%) (Table1). None of the infected birds in the present study had shown any clinical signs of disease. The sexual forms of both *Plasmodium* spp. and *Haemoproteus* spp. are almost similar, thus to avoid misevaluation of these 2 species, *Plasmodium* spp. was identified by the presence of both schizonts and round or enlarged gametocytes in the blood smear (Fig. 3, 4, and 5), while *Haemoproteus* spp. are characterized by the presence of only enlarged (halteridium) or round gametocytes in blood smear (Fig. 6).



Figure 1: Chukar partridge, *Alectoris chukar* subspecies *Kurdestanica* (22)

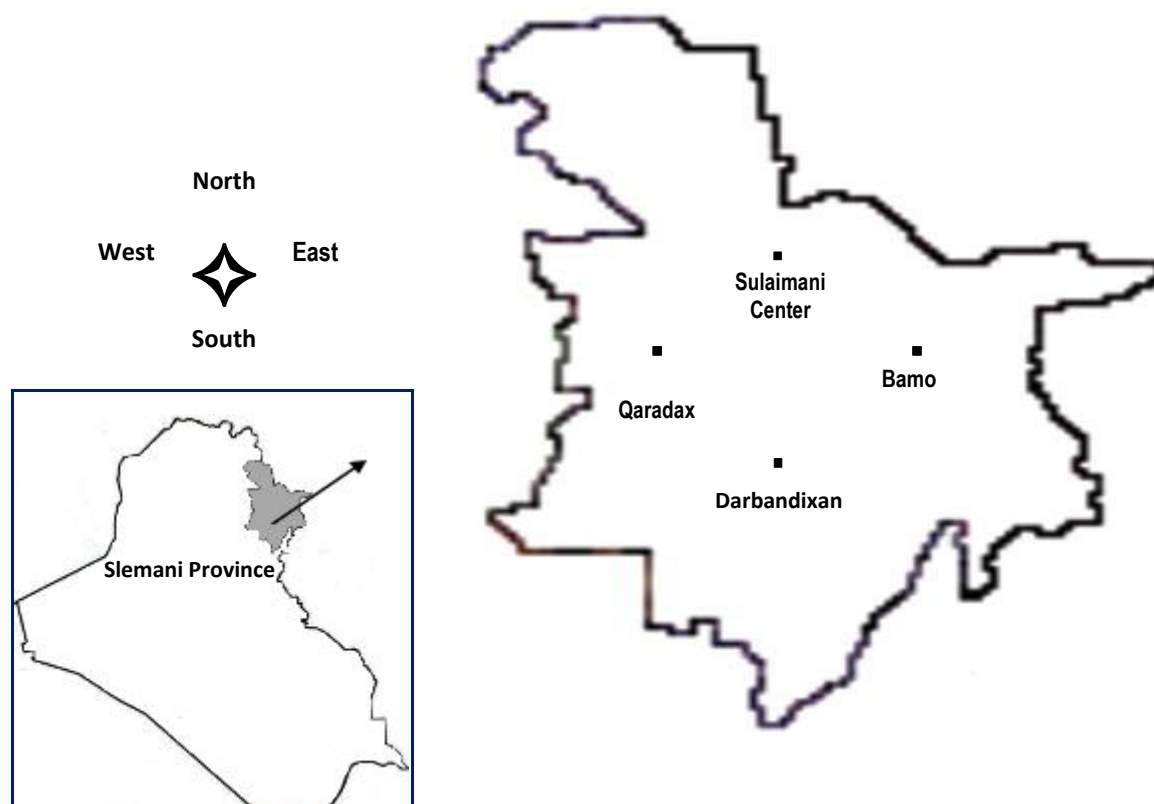


Figure 2: Map of the Study Area in Sulaimani Province in Kurdistan Region, Iraq (23)

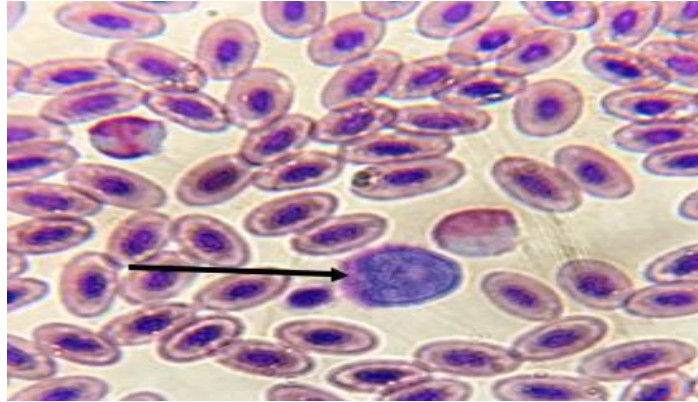


Figure 3: Gametocyte stage of *Plasmodium* spp. in erythrocytes of Partridges (black arrow).

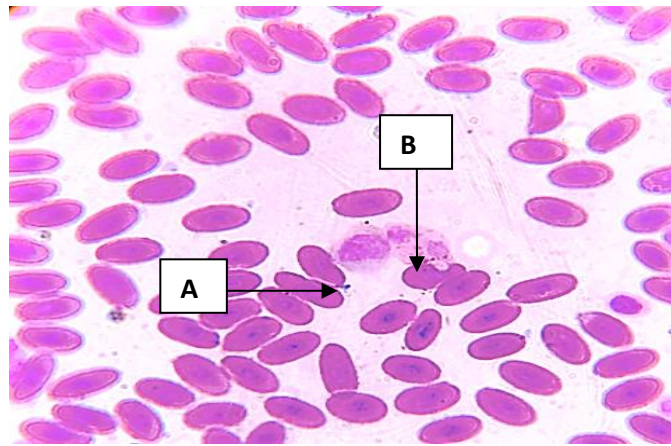


Figure 4: A. Gametocyte Stage of *Plasmodium* spp. in erythrocytes of Partridges, and
B. Immature Schizont Stage of *Plasmodium* spp. in erythrocytes of Partridges

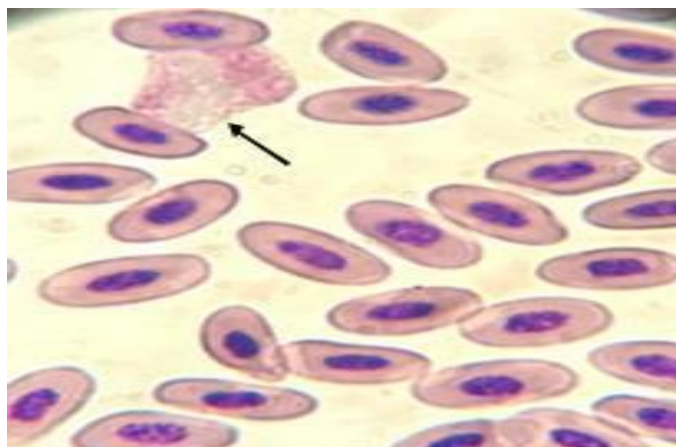


Figure 5: Amoeboid Stage of *Plasmodium* spp. in erythrocytes of Partridges (black arrow).

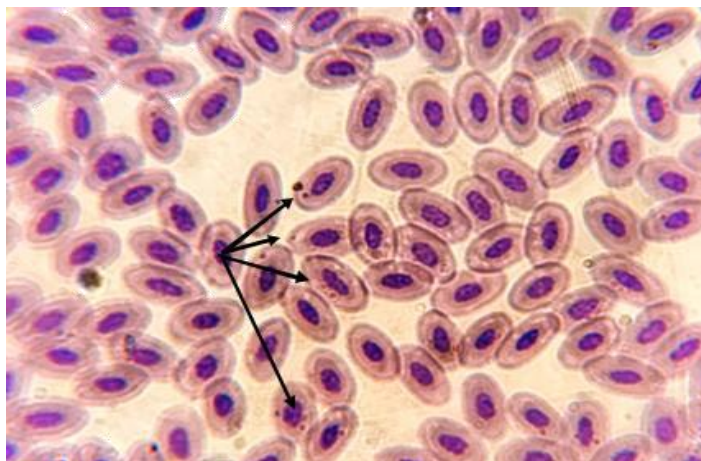


Figure 6: *Haemoproteus* Parasite in erythrocytes of Partridges (black arrows).

Table 1: The infection rate according to the different parasite species

No. of birds examined	No. of blood films examined	Positive samples (ve+)	Type of parasite found	Infection %
100	200	46	<i>Plasmodium</i> spp.	46%
		12	<i>Haemoproteus</i> spp.	12%
		2	Mixed infection (<i>Plasmodium</i> spp. and <i>Haemoproteus</i>)	2%
Total		60		60%

Discussion

Haemosporidians are one of the most familiar and well-studied groups of parasites because they include the causative factor of human malaria (5). Till now, studies in Kurdistan Region-Iraq trailed to elucidate the infection of blood protozoa in chickens and turkeys, being 17.36 % and 19 %, respectively (26, 27), but no attempt was carried

out to investigate the presence of blood protozoa in partridges, and this was the objective of the study. The obtained data

revealed an indication of the infection with blood parasites in chukar partridges in Sulaimani province/Kurdistan Region-Iraq. In the present study, *Plasmodium*, and *Haemoproteus* protozoan parasite were identified in partridges. Out of the total examined birds (100) in this study, 60(60%) were infected at least with one of the protozoan parasite this result concurs with prevalence reported by (28) that was (60%), and was relatively high compared to that previously reported (32.9%, 3.91%) from southern Iran (29, 30), (7.7%) in Iraq (31),

(5.9%) in Japan (32) and (6.2%) in Bulgaria (33). The high prevalence rate of blood parasites (60%) in the studied regions of Sulaimani Province, North of Iraq, maybe due to appropriate environmental conditions for vectors as well as the large population of free-ranging poultry in the area where they kept in free-range systems or on pastures are more exposed to vectors.

Forty six samples (46%) were diagnosed to be infected with *Plasmodium spp.* which was relatively higher than that reported previously in other countries (29,34), (2.34%,4.6%), whereas 12% of the blood samples, were positive for *Haemoproteus spp.* that was in agreements with the results recorded in Portugal (35), in which they found that 12%, of the birds were infected with *Haemoproteus spp.* and in Pakistan (36) which was revealed that 12.2% of the pigeons were infected with *Haemoproteus spp.* and higher than some other researches (37,38,39) in which they found that (6.6%) were positive for *Haemoproteus spp.* Simultaneously, our result is lower than those records in Nigeria (40), in Slovakia (41) in Iran (42), in Ankara District (43), various areas of Iran (44,45,46), which were revealed 14%, 56.6%, 47.05%, 50%, 57%, 24%, 30%, and 17.47%, respectively. On the other hands, in Slovakia revealed high infection rates (21 %) that may be due to the high level of blood parasite vectors that is available at the hot seasons (47). Finally, we found that no obvious clinical signs were observed in infected partridges, which might be due to low numbers of parasite in the blood and potent bird immunity against parasites.

Conclusion

From the results of the study, it was clear that partridges can be infected with *Plasmodium*, and *Haemoproteus* blood parasites and it can be a source of infection to other domestic and wild birds and that will lead to the economic loss of poultry in our country.

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