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PREVALENCE OF SOME HAEMOSPORIDIANS IN DOMESTICATED CHICKENS IN BAGHDAD CITY

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Abstract

This study was based to estimate the infection rates of haemosporidians protozoa and the relationship between sex, age and months on these rates in the local domestic breed chickens (*Gallus gallus domesticus*) of different ages and sexes purchased from the local markets in Baghdad city, by using 180 blood samples collected from wing vein, during the period extended from 1/10/2018 till 31/3/2019. The total infection rate of haemosporidians (*Plasmodium* and *Leucocytozoon*) examined by blood smears was 44.44% and the infection rate according to the genera of parasites was 28.33 % in *Plasmodium* spp. and 30.00% in *Leucocytozoon* spp. with a significant (P <0.01) difference. There was no significant effect of age in the infection rate, the infection rate in young chickens was 33.84% compared to adults (50.43%). The sex had a significant (P <0.01) effects in the infection rates, that were 44.31% in males and 44.56% in females, that was in *Plasmodium* spp. 30.43% in females and in males 26.13% and in *Leucocytozoon* spp. it was 30.43% in females and 29.54% in males. In conclusion, a highly spread of haemosporidians protozoa specially *Plasmodium* and *Leucocytozoon* in domestic chickens in Baghdad city.

Key words: *Plasmodium*, *Leucocytozoon*, Domestic chickens, Haemosporidia, *Gallus.*

Introduction

Haemosporidians infections as a protozoa parasites that causing diseases by a group of parasite which infect mammals, reptiles, birds and amphibians (Valkiunas, 2005) and there are three genera namely, *Plasmodium*, *Leucocytozoon* and *Haemoproteus*, of avian haemosporidians (Beadell and Fleischer, 2005) and the species of these three genera are faithful, related genetically, but their life-history traits differ, besides all three genera, but most often only *Plasmodium* spp. are referred to the avian malaria parasites (Hellgren *et al*., 2004). They causing diseases such as avian malaria, leucocytozoonosis and haemoproteosis (Martinsen *et al*., 2006).

Majority of the published works in the field of avian haemosporidians studies fixated on species of the genera *Haemoproteus* and *Plasmodium*, because they are more easily detected, while there are few studies on *Leucocytozoon* spp. comparatively. (Atkinson and van Riper III, 1991). Life cycles of these parasites need two hosts, according to the species of parasites, undergo in invertebrate host (vectors), sexual reproduction (Desser and Bennett, 1993), *Culex* mosquitoes (van Riper III *et al*., 1993) and Diptera (Culicidae), (Piovesan-Alves *et al*., 2005) and in vertebrate host was asexually (Garnham, 1966). Malaria was cause by genus *Plasmodium* spp. in female mosquitoes develop only, most often of the *Culex* (*Culicoides midges*) in genus *Haemoproteus* spp. and *Hippoboscid* flies, while use Simuliids flies in genus *Leucocytozoon* spp. (Atkinson and van Riper III, 1991; Valkiûnas, 2005). The infection of these parasites (avian malaria) may be severe for birds in zoos or domestic and the severity depending on the infection routes, sex, age, breed, diet and husbandry (Ferrell *et al*., 2007). Females are less resistant than males (Bennison and Coatny, 1948) and affected birds suffer from anemia, weakness, dyspnea and death in extreme cases advanced and anorexia (Grenier and Ritchie, 1994). There are different diagnostic methods used for detection of the haemosporidians parasites, such as the traditional methods (Blood smears), that detect the infection by microscopic examination (Fallon *et al*., 2003). Due to the importance of haemosporidians, high spread with their economic loss, mortalities and their prevalence not well known in domestic chickens in Baghdad city, this study was conducted.

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Matrials and Methods

Area and period of the study

The area of the study includes local markets of Baghdad Al Jadida, Abu-Ghurib and Al-Baia during the period from 1/10/2018 till 31/3/2019.

Animals of the study: One hunderd and eighty local breed chickens (*Gallus gallus domesticus*) males, females, young and adults were randomly purchased.

Blood samples collection: About 1-2 ml of wing blood were collected from each bird by a sterile syringe 5 ml (Al-Daraji *et al*., 2008), putted in EDTA (Ethylene diamine tetraacetic acid, K_2) tubes, brought to the Laboratory of Parasitology/College of Veterinary Medicine/Univercity of Baghdad for prepeared a thin blood smears, air dried, absolute methanol fixed for 3-5 mintes and stained by Giemsa stain (10%) for 20-30 min. to identify haemosporidian parasites (Soulsby, 1982; Samour, 2008).

Statistical Analysis: Chi-square was used for determined the effects of epidemiological factors (age and sex) of the study at a significant ($P< 0.05$) difference level (Al-Mohammed *et al.*, 1986).

Results

Infection rate of haemosporidians parasites in domestic chickens (*Gallus gallus domesticus*).

The total infection rate of haemosporidians (*Plasmodium* spp. and *Leucocytozoon* spp.) in chickens (*Gallus gallus domesticus*) by Giemsa stain blood smears was 44.44% (80/180). (Table 1).

The infection rate of haemosporidians according to genus of parasite

The infection rate according to genera of parasite 28.33 % (51/180) was recorded in *Plasmodium* spp. and 30.00% (54 /180) was found in *Leucocytozoon* spp. with significant($P\leq0.01$) difference. (Table 2).

Table 1: Total infection rate of haemosporidians in chickens (*Gallus gallus domesticus*) by Giemsa stain.

No. of sample examined	Positive	Percentage (%)
180	80	44.44

Table 2: The infection rate of haemosporidians according to genus of parasite (*Plasmodium* spp. and *Leucocytozoon* spp.) in domestic chickens(*Gallus gallus domesticus*) by Giemsa stain.

Genera of parasites	No. of sample examined	Positive	Percentage (%)
Plasmodium spp.	180	51	28.33
Leucocytozoon spp.		54	30.00
χ^2	*50.18		

*$P\leq0.01$

Table 3: The infection rate of haemosporidian in domestic chickens (*Gallus gallus domesticus*) according to age of by Giemsa stain.

Age	No. of sample examined	Positive	Percentage (%)
Young 6 months	65	22	33.84
Adult 6 months	115	58	50.43
χ^2	*3.66		

*Non significant ($P\geq0.05$)

Table 4: The infection rate of haemosporidians in domestic chickens (*Gallus gallus domesticus*) according to sex by Giemsa stain.

Sex	No. of sample examined	Positive	Percentage(%)
Males	88	39	44.31
Females	92	41	44.56
χ^2	*1.11		

*Non significant ($P\geq0.05$)

The effect of age in the infection rate

A higher infection rate 50.43% (58/115) was found in adult domestic chickens (*Gallus gallus domesticus*) more than 6 months, while the lower infection rate 33.84% (22/65) was recorded in young animals less than 6 months without significant ($P\geq0.05$) difference. (Table 3).

The effect of sex in infection rate

A higher infection rate 44.56% (41/92) of haemosporidians was recorded in females, while the lower infection rate 44.31% (39/88) was found in males without significant ($P\geq0.05$)difference. (Table 4).

The infection rate of haemosporidians according to the sex and genera of parasites

A higher infection rate 30.43% (28/92) of *Plasmodium* sp. was found in females of domestic chickens (*Gallus*

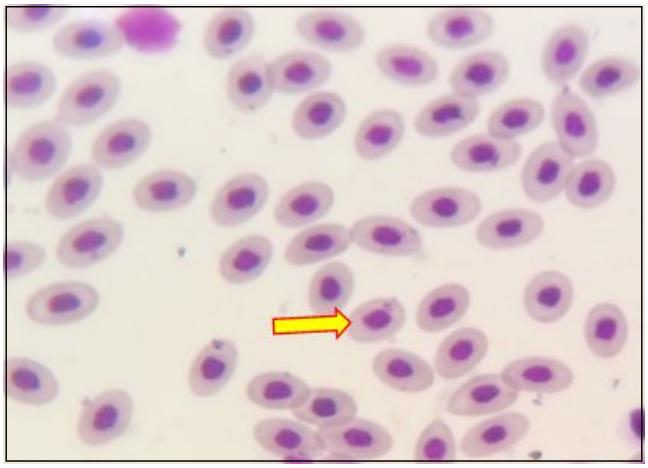

Fig. 1: *Plasmodium* spp. in the red blood cells of domestic chickens (*Gallus gallus domesticus*) stained by Giemsa stain (X100).

Fig. 2: *Leucocytozoon* spp. in blood of domestic chickens (*Gallus gallus domesticus*) stained by Giemsa stain (X100).

Table 5: The infection rate of haemosporidians (*Plasmodium* spp. and *Leucocytozoon* spp.) in domestic chickens (*Gallus gallus domesticus*) according to the sex by Giemsa stain.

Sex	No. of samples examined	*Plasmodium* sp. Positive (%)	*Leucocytozoon* sp. Positive (%)
Males	88	23 (26.13)	26 (29.54)
Females	92	28 (30.43)	28 (30.43)
χ^2	*31.47		

* P≤0.01

gallus domesticus) than males 26.13% (23/88), also in *Leucocytozoon* spp. a higher infection rate 30.43% (28/92) was recorded in females, while the lower infection rate 29.54% (26/88) was recorded in males with significant (P≤0.01) difference. (Table 5, Fig. 1, 2).

Discussion

The result of the present study were shown a higher infection rate of haemosporidians in domestic chicken (*Gallus gallus domesticus*) by *Plasmodium* and *Leucocytozoon* and they were showed higher infection rate in adult compared to the young chickens and in females than males. These results are differ than the results that recoded previously such as Zamaura-Vilchis *et al*., (2012) who were found 32.3% an infected with haemoparasites, 19.9%, *Haemoproteus* 6,2% *Leucocytozoon* and 1,74% *Plasmodium* is bird, Fernandez-Davila and Phalen, (2013) were found in birds 11,4% infected with haemosporidians 51.1% *Leucocytozoon* and 31.4% *Haemoproteus* and 10.9% *Plasmodium*, that differences may be due to their biological habitat of these parasites which are heteroxenous parasite and need more than one obligatory host type in their life cycles, the intermediate hosts are vertebrates and the definitive hosts are dipteran insects, which transmit the infective stages between birds hosts (Atkinson and Van RiperIII, 1991; Valkiunas, 2005; Angrisano *et al*., 2012) and the development process in vectors are essentially conserved in avian parasites (Garnham, 1966; McGhee *et al*., 1988). On the same hand, these parasites were monitored by microscopic analysis of thin blood smears stained with Giemsa stain (Prunk-Nern *et al*., 2014), but it is not a reliable method, when it is performed by non-expert due to lake of training expertise as it requires special training and considerable expertise (Chen *et al*., 2013; Razzak and Al-Haqban, 2015), in spit avian malaria has been detected by microscopic examination of blood smears (Greiner *et al*., 1975; Mcclure *et al*., 1978; Peirce, 1981; Atkinson and Van Riper III, 1991) and the intensity of infection can be estimated for each host by using blood smears (Valkiunas, 1993; Richner *et al*., 1995; Rintamaki *et al*., 1998). In the same way, that differences may be related to the diversity of the vectors (*Culex*, *Aedes* and *Simulim*), which are abundant of river, lacks and/or to the specimens that were collected (Cohen, 1977) and with mentioned the phenomena of low grade parasitaemia. In addition, the abundance of rivers and lacks have a highly influence in the infection rates (Zahar, 1984), as well as the bodies of chickens were almost fully covered by feathers compared with mammals, that maybe shows a highly infection rate (Tanner, 1998; Snow *et al*., 1999). Haemoparasites infection mainly depend on an invertebrate vectors usually sucking insects to infect their avian host (Valkiunas, 2005), which are effects and influence the hosts habitat choice and the bird species are unable to develop a resistance to these parasites may have vectors and abundance increases the chances to infection (Atkinson *et al*., 1995, 2000; Woodworth *et al*., 2005). Also, to the migration allows areas increases the infection (Perez-Tris and Bensch, 2005; Perez-Tris *et al*., 2007). In conclusion,the haemosporidian parasites (*Plasmodium* spp. and *Leucocytozoon* spp.) are highly distributed in domesticated chickens (*Gallus gallus domesticus*) in Baghdad city.

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