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 (Martinse 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 Simulids flies in genus Leucocytozoon spp. (Atkinson and van Riper III, 1991; Valkiunas, 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.
Materials 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 hundred 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, K₂) tubes, brought to the Laboratory of Parasitology/College of Veterinary Medicine/University of Baghdad for prepared a thin blood smears, air dried, absolute methanol fixed for 3-5 minites and stained by Giemsa stain (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

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

<table>
<thead>
<tr>
<th>No. of sample examined</th>
<th>Positive</th>
<th>Percentage (%)</th>
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<tr>
<td>180</td>
<td>80</td>
<td>44.44</td>
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</table>

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

<table>
<thead>
<tr>
<th>Genera of parasites</th>
<th>No. of sample examined</th>
<th>Positive</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Plasmodium</em> spp.</td>
<td>180</td>
<td>51</td>
<td>28.33</td>
</tr>
<tr>
<td><em>Leucocytozoon</em> spp.</td>
<td>180</td>
<td>54</td>
<td>30.00</td>
</tr>
<tr>
<td><em>χ²</em></td>
<td></td>
<td><em>50.18</em></td>
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*Non significant (P>0.05) significant(P≤0.01) difference. (Table 2).

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* > 0.05) 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* > 0.05) 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 gallus domesticus*).

![Fig. 1: *Plasmodium* spp. in the red blood cells of domestic chickens (*Gallus gallus domesticus*) stained by Giemsa stain (X100).](image-url)
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 Riper III, 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 *Simulium*), 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.

**References**

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