

Study of blood picture and some serum proteins in local chickens and domestic pigeon naturally infected by soft ticks.

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Abstract

Our study which conducted from 1/9/ 2019-1/9/2020, was including examination of 150 female bird(75-local chickens,75-domestic pigeon), the results were showed the total percentage of infestation 60%(90/150),in local chicken was65.333 % (49/75) while in pigeon was54.666%(41/75), also was diagnosed: *Dermacentor variabilis* and *Argus persicus* in ratios(25.333%)(19/75),(40%)(30/75) respectively in local chickens, 44%(33/75),10.666 % (8/75) respectively in pigeon, also noticed that was a significant decrease in the concentration of Hemoglobin, the blood packed cells volume, red blood cells, Mean Corpuscular Hemoglobin, while there was increase in number white blood cells in tick-infected avian compared with Non-infected(control group), while the data of biochemical parameters of the serum, showed there were increased levels of total protein and albumin ,while decreased levels of globulin, glucose as well as cholesterol in infected avian.

Keyword: Blood picture, Ticks, Local chicken, Biochemical test, Pigeon.

1-Introduction

Birds are an important part of livestock in most countries, as they provide meat and eggs that contain animal protein, as birds play an important role in transporting many parasites to other birds or other animals and this causes major economic problems [1,2].

Birds suffer from many parasites that may be internal or external, such as mites, ticks, fleas, and lice that parasite on the feathers and skin of birds, causing great economic damage, especially in poultry because they transfer a lot of blood protozoan to birds, as well as transferring many pathogens such as Newcastle, Fowl pox, Pasturellosis, Chlamydia [3,4].

Lice and tick is found in infested birds, these organisms play a necessary role in continuous of the continuation of the avian alive and in the transport of infection to non-infected avian [5], domestic avian is infested with 40 species of external parasites (lice and ticks)that present on each part of the bird's body , Leading to many Mortality in poultry fields [6]. A danger external parasites is higher than dangerous of internal parasites because of the wide spread of these organisms, Their higher potential to tolerate unsuitable status, all these making them pests that kill birds, these parasites do as transported factors for many pathogenic agents such as bacteria, viruses, being intermediate hosts for many tapeworms and nematodes [7],external parasites belongs to the Phylum: Arthropod, which is divided into two class: Arachnida, ex: mites, ticks, scorpions, and Classes: Insecta ex: lice, fleas, mosquitoes and flies [8].

All species of ticks are obligate parasites(OBP), it belongs to the Acarina, it parasitic on reptiles, birds, this parasite(ticks)take the blood of prey as food, lead to disorder in the prey, as well as act as the transport for virus, bacteria [9]. Therefore, this work aimed to knowledge the effect of ticks on some hematological and biochemical parameters in local chickens and domestic pigeons.

2- Methods

1-Samples collection

Our study was conducted at the period 1/9/ 2019-1/9/2020, 150 female birds were examined from local chicken and domestic pigeon (75 bird for each type) have been purchased from local markets in Al-Diwinyah province and were selected randomly after being examined for identified external parasites as well as knowledge of non-infected birds and isolate as control group, the whole the bird body of were examined and the tick was collected manually using the forceps. It was then put in a tube has 70% alcohol, then put in glass tubes has 5% KOH solution for period (3-5, 12-10) days for larval stages, adult of parasite until all the specimens became transparent and then transferred to ascending concentrations of alcohol (70% -100%) for period 24 h for each concentration , then It was put in a Petri dish with pressure on the dorsal and ventral sides with two glass slides and loaded onto a special glass slide designed for this purpose then put a drop of Canada Balsam, then the cover slide [10] then some of samples were sent to the Museum of Natural History(MNH) in Baghdad for diagnosis .

2-Samples examination.

According to (11), by using syringe 5ml, blood sample was withdrawn from all non-infested (control group) avian and infested, then divided the blood into two parts as follows:

- a- 2ml of blood sample was put in EDTA-containing vial to conduct blood tests ex: Packed Cell Volume(PCV), Hemoglobin(Hb), Red blood cell Count(RBCs), White Blood Cell Count(WBCs), Mean Corpuscular Hemoglobin(MCH).
- b- For obtain the serum, 3 ml of blood is put in Heparin-free tube, the tubes leaved for a short time until the blood clotted, after that the tubes put in centrifuge at (3000c/m) for period 15m, then take the liquid (serum) without the thrombus and put it in cap-sterile tubes and saved at -20 C₀ for used in measured the cholesterol, glucose, total protein, globulin and albumin.

3-Statistically

The results were analyzed using according to SPSS version 10.5 software ($X \pm SE$), to determine the differences between infected group and control group at ($P \leq 0.05$) according to [12].

3-Results and Discussion

The results was showed that the total incidence of ticks was 65.333% and two species were recorded: *Argus persicu* and *Dermacentor variabilis* at percentage (25.333 %,40%) respectively in chicken ,while in pigeon was(44%, 10.666%) respectively as in table (1).

Table (1): Incidence rate of ticks in avian.

| Birds | No. examined | No. infected | % | Parasites (Ticks) | Total |
|-----------------|--------------|--------------|---------|-------------------------------|-----------------|
| local chickens | 75 | 19 | 25.333% | <i>Argus persicus</i> | 49 (65.333)% |
| | | 30 | 40% | <i>Dermacentor variabilis</i> | |
| domestic pigeon | 75 | 33 | 44% | <i>Argus persicus</i> | 41 (54.666)% |
| | | 8 | 10.666% | <i>Dermacentor variabilis</i> | |
| Total | 150 | 90 | 60% | | |

The results of the our study explained that local chickens were infested by the following species of ticks: *Argus persicus* and *Dermacentor variabilis*, the data of our work is similar to the study of [13] which include examined (50) avian of *Meleagris galbpavoli*, isolate *Argus persicus* (2%), *Haemophysalis* sp (Nymph) (2%), *Argus persicus* has a universal prevalence and does not specialize in one type of avian has been showed in most poultry and non-poultry species , also a study [14]was isolated *Argus persicus* in percentage 1% in Al-Diwaniyah province, also the ratios of *Argus persicus* which recorded in the current study is higher than the ratios 36.4%, 18 .8% which recorded in chicken and pigeon respectively in a study[15],and higher than the ratio 6.8% in a study[16],what is known is that the local multi-colored chicken is more susceptible to external parasites, especially lice and mites, than white or black chicken, this noticed in a study [17] who indicated that a rate of infection of lice in colored chicken is higher, reaching (55%) compared to the percentage of white chicken infection (28%) and black (18%),our results, were disagree with the results of the study [18] which included isolated of *Dermacentor variabilis* at a percentage(1%), *Menacanthus straminus* at a percentage (4.4%) in *Meleagris galbpavolin* in united states .

The parameters of blood picture (BP)is one of the very important indicators for the pathogens effects , the data in table (2) indicator to significant differences(SD) in blood parameters of the local chicken, domestic pigeon infected with ticks when a compared with the control group(CG) where was there a significant decrease in the concentration of MCH, Hb, PCV, and (RBC) in tick-infected birds at ($P \leq 0.05$),this may be because the feeding of these parasites on the blood of the infested bird, leading to the rupture of the bird's skin then hemorrhage of blood and anemia[7], It is also noted that there is a significant increase in the total number of white blood cells (WBC) in an infested birds because of the activity of the immune system as react for the infestation for parasites [19]as well as inflammation resulting from the presence of parasites[20].

Table (2): Blood picture of birds infected with ticks compared with the control group.

| Test Group | | MCH (pg) | Hb g / dl | PCV (%) | RBC 10 ⁶ cells / mm ³ blood | WBC 10 ³ cells / mm ³ blood |
|-----------------|----------|-------------|--------------|-------------|---|---|
| local chickens | Infected | 28.7±0.04 | 8.81 ±0.95 | 23.36 ±1.76 | 2.19 ±1.21 | 25.32±0.91 |
| | Control | 30.33± 0.26 | 11.15 ±0.78 | 30.88±1.82 | 3.14±1.77 | 20.54±0.81 |
| domestic pigeon | Infected | 26.9±0.13 | 10.61 ±0.84 | 25.21 ±0.85 | 2.00±0.91 | 17.88±1.41 |
| | Control | 29.21± 0.15 | 12.14 ±0.56 | 28.97±1.61 | 3.15±1.84 | 19.44±0.72 |

$\bar{X} \pm SE$: \bar{X} = arithmetic mean , SE =Standard Error. P.Value ≤ 0.05

The data in table (3) showed there were a significant different(P.Value ≤ 0.05) between infected birds and control group in all studied parameters, this include decrease in the levels of glucose, cholesterol, globulin ,while there were increase in total protein concentration(TPC) and albumin in the infested birds compared with the control group(CG) which showed the highest values, the glucose -low concentration and globulin for infected birds may be due to loosed the appetite for food of because the discomfort a decrease cholesterol levels due to liver damage and failure to build cholesterol because of effect of the parasite on the infested avian due to the effect the toxicity caused by the secretions of these parasites in the blood [21], the data in our work agree with the findings in a study[22]on the chicken experimentally infected with lice, also indicated to low glucose and cholesterol values, while the total protein and albumin ratios in current study have been observe to be high may be because of the body's need for proteins such as antibodies to counter the danger of parasites.(23).

Table (3):Some biochemical parameters of birds infected with ticks compared with the control group.

| Avian | Test Groups | total protein (g/l) | globulin (g /l) | albumin (g/l) | cholesterol (mg/dl) | glucose (mg/dl) |
|-----------------|----------------|------------------------|--------------------|------------------|------------------------|--------------------|
| local chickens | Infected | 43.95±1.17 | 23.24±1.16 | 18.71±0.35 | 72.36±0.81 | 146.73±1.99 |
| | Control | 40.87±0.94 | 25.11±0.4 | 17.77±0.88 | 126.64±0.57 | 187.47±1.50 |
| domestic pigeon | Infected | 44.15±1.11 | 24.00±1.87 | 17.62±0.45 | 80.22±1.61 | 154.61±1.00 |
| | Control | 38.87±0.65 | 27.56±0.9 | 16.77±0.68 | 130.10±1.21 | 179.33±1.66 |

$\bar{X} \pm SE$: \bar{X} = arithmetic mean , SE =Standard Error,, P.Value ≤ 0.05

Conclusion: Through the current study, we found that the local chickens and domestic pigeon infected by two types of Tick: *Argus persicus* and *dermacentor variabilis* also we found these parasites effect on the blood picture and biochemical parameters.

References:

- 1-Eslami, A. Ghaemi, P.; Rshbari, S. (2009).Parasitic infection of free-range chickens from Golestan province. *Iran J Parasitol.* 4:10-14.[http:// ijpa.tums.ac.ir](http://ijpa.tums.ac.ir).
- 2- Soulsby, EJ. (1982). Helminthes, arthropods and protozoa of domesticated animals 7th. New York: William and Wilkins .p 368-386,452-456. <https://trove.nla.gov.au/work/22227220?q&versioned=46370853>.
3. Nnadi, PA. George ,SO. (2010).Across-sectional survey on parasites of chickens in selected villages in the subhumid zones of south-eastern Nigeria. *J Parasitol Res.*:1-6. doi.org /10. 1155/2010/ 141824.
4. Taylor, M.A.; Coop, R.L; Wall, R.L.(2016).Veterinary Parasitology 4th ed. India ,Wiley Black Well.737-740. :www.BlackwellVet.com.
- 5-Awad, A.H. ;Abdullah, B.H. and Al-Mayah, S.H. (1994). Some nematodes parasitized in seven species of aquatic birds in Basrah, Iraq. *Basrah J. Sci.*, Ser. B, 12(1): 64-69.
- 6-Saif,Y. M.; Barnes, H.J.; Glisson, J.R. ;Fadly, A.M.; McDougal ,C.R and Swagne, D.E.(2003). Diseases of Poultry.11th ed. *Iowa State Press, Black well publishing Co.*
- 7-Permin, A. and Hansen, J. W. (1998). Epidemiology, diagnosis and control of poultry parasites FAO Animal Health Manuals 4. Rome : *Food and Agriculture Organization of the United Nations (FAO)*. PP 160.
- 8-Al-Bahi, Muhammad. (2005). External parasites of the animal and methods of elimination, Faculty of Agriculture and Veterinary Medicine, Al-Qassim University: 5 p.
- 9-Keirans, J.E. and Durden, L.A. (2005). Tick systematic and identification In: Goodman, J.L.; Dennis, D.T.; Sonenshine, D.E. editors. *Tick-Borne Diseases of Humans. Washington, DC- ASM Press.* 401.
- 10-Soulsby, E.J. (1982). Helminthes, Arthropods and protozoa of. Domesticated Animals. 7th ed., *Bailliere Tindall, London, UK.*
- 11-McPherson,R and Pincus,M. (2016). Henry'sClinical Diagnosis and Management by Laboratory Methods, 23rd Edition.W.B Saunders Company, Philadelphia, P:60.
- 12- Niazi, A. D. (2001). Statistical analysis in medical research..Uni. Nahrein Republic of Iraq. 148.
- 13-Al-Shaibani, M.,S.(2013). An epidemiological and diagnostic study of the types of lice of some birds in the city of Al-Diwaniyah. Master Thesis. Faculty of Education. University of Al-Qadisiyah .107.

14-Soulsby ,E.J.L. (1968).Helminthes, arthropods and protozoa of domesticated animals. London: *Baillière Tindall & Cassell Ltd.* 112-24.

15-Al-Shaibani, K.T.M. (2008). *Isolation and diagnosis of ectoparasites and worms parasitic on digestive system to Columba livia* (Gmelin, 1789) in Al- Diwaniyah city. M. Sc. Thesis, College of Education, University of Al -Qadisiyah, Iraq:138.

16-Manal, H. H.(2019). Detection of external parasites in different birds. *Iraqi Journal of Veterinary Science*, Vol. 33 (2): 41-37.

17-Al-Saffar, T. M. and Al-Mawla, E. D. (2008).Some hematological changes in chickens infected with ectoparasites in Mosul. *Iraqi Journal of Veterinary Sciences*, Vol.22, No. 2, (95-100).

18-Fabiyi, J P. (1986). Exclusion in Nigeria of chickens and guinea fowls from the host range of *Menacanthus stramineus* (Mallophaga: Insecta). *Revued'Elevage-et-de-Medicine-Veterinaries Pays -Tropicaux*. 39(3-4): 377-379.

19-Robert, S. L., Thomas F. K., Reginald H. Barrett, Jeomhee M., Chunling W., and Vincent S. S.(2006). Wild turkey (*Meleagris gallopavo*) as a host of ixodid Tick , Lice , and Lyme disease spirochetes in California state parks . *Journal of Wildlife Diseases*, 42(4) : 759–771.

20-Wikel, S.K.(1996).The Immunology of Host-Ecto-parasitic Arthropod Relationships, CABI , Wallingford, UK. 331.

21-Rick, L.C. and Elsevier, M.(2004). *Veterinary clinical pathology secrets* 2nd ed, Elsevier Mosby Missouri :282-301.

22- Machado, C. M .(2002).*Crescimentodo Tecido Adipose* .In: Macari, M.; Furlan ,R. L. and Gonzales, E. *Fisiologia aviaria aplicada a frangos de corte Jaboticabal:Funep-Unesp*.p375.

23-AL-Lebawi, F. I. M.(2015). Hematological, Biochemical and Histopathological changes in experimentally infected local chickens with Biting lice, and its relationship in transmission of *Toxoplasma gondii* in chickens. A Thesis Master, College of Education /University of AL-Qadisiyah. 80 p.