



Physiological and biochemical study of blood of infested local cows with liver fluke in Samara city farms

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ARTICLE INFO.

Article history:

-Received: 30 / 1 / 2021

-Accepted: 27 / 5 / 2021

-Available online:

Keywords: liver fluke , local cow, hemoglobin, biochemical parameters

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ABSTRACT

The current study was designed in Samara city to investigate changes in physiological and biochemical parameters associated with liver fluke infection. In this study, we used (10) cows , divided into two groups. The first group consisted of (5) infected cows. The second group included (5) non-infected cows as a control group. Blood samples were collected from both groups, and the physiological parameters were measured (red blood cells, white blood cells, blood hemoglobin concentration, Packed cell volume).

The biochemical parameters were (total protein, albumin, globulin, Alanine transaminase, Blood urea nitrogen and Creatinine). The results showed that (red blood cells, white blood cells, hemoglobin concentration, volume of blood cells) significantly increased ($P \leq 0.05$) in the infected group compared with the healthy group except white blood cells, they recorded a significant increase in the infected group Compared with the healthy group. Total protein, albumin, globulin, blood nitrogen urea were significantly lower in the infected group compared with the healthy group, while both Alanine transaminase and Creatinine were significantly decreased in the non-infected group compared to the infected group. We conclude from this study that the infection of liver worms had a negative impact on the blood picture and some of the biochemical parameters and this is a clear indicator of the disturbance of animal health and a negative impact on its products.

1. Introduction

Ruminants are infected with many parasites that adversely affect the health and production of the animal. These parasites include hepatic worms, *Fasciola gigantica* and *Fasciola hepatica*, which are endemic parasites that infect all kinds of ruminants and cause disease and sometimes death in most ruminants, including sheep and cattle [1]. The presence and spread of these worms are affected by several factors such as changes in the environment such as grazing on the highlands, rainfall, temperature, grazing season as well as administrative and preventive measures taken by livestock owners [2]. The researcher [3] explained that the infection of liver worms causes a clear paleness of the mucous membranes and the occurrence of anemia. After the dissection of the carcass, it is observed in the liver irregular lines and pale in color and has a strong touch [4]. While the histological sections in the chronic cases of the infected liver showed that there is a narrowing in the size of internal channels and thicken in the channel of bile and notes in the liver of cows infected with gall bladder enlargement due to narrowing channels resulting from the migration of liver worms, and may be the eggs of these worms cause granuloma tumors and therefore Fibrillation of fibroblasts mixed with lymphocytes with few mononuclear cells; adult worms cause necrosis and ulceration of epithelial tissue and hyperplasia of the epithelial layer[5]. At the same time, it is noticed that adult hepatic leukemia is transmitted through the bronchyma tissue of the liver, creating channels of migration, causing liver enlargement and bleeding with fibrous exudates on the surface of the capsule, Bleeding is dark lines[6]. All of these changes in the liver are partial results from these worms in the liver because the liver

injury can occur because of the putrefied secretions of those worms or the breakdown of tissues The liver channels must therefore need The physiological and biochemical tests of enzymes that will help to assess the extent of damage in liver tissue and control the extent of disease in infected animals[7]. Any diagnosis based on physiological tests and if enhanced by chemical parameters will have a significant impact on the assessment damage and changes taking place, so the current study aims to:

1. To investigate the effect of the infection on some parameters which are indicative of the health and production of the animal.
2. To measure some of the previously unknown biochemical parameters in Iraq and to clarify their relationship with the disease.
3. The possibility of adopting some parameters as an indicator of disease in order to detect early infection.

2. Materials and methods

Blood samples were collected from (10) cows divided into two groups, the first group (5) infected cows, the second group included (5) healthy cows counted as a control group. The study lasted about three months since 20/12/2019 to 23/3/2020 in the city of Samara, blood samples were collected before slaughtering animals using sterilized syringes size 10 ml and divided the blood into two parts. The first part was kept in the test tubes contains EDTA To measure blood parameters .The other part was kept in test tubes free from anticoagulant to separate the serum by using a centrifuge at 5000 cycles / minute, the serum was separated and then frozen for the purpose of conducting biochemical parameters.

1- Blood picture : Hematology coulter was used to calculate the total number of red blood cells, the concentration of

hemoglobin, the packed cell volume, the total number of white blood cells.

2- **Biochemical parameters:** The following parameters were measured:

- Determination of total protein level in the serum: Determination of total protein level using a ready kit according to the payoret method, which is based on the method[8].
- Determination of albumin level in serum: serum albumin level was measured using syrbio kit (Syrian kit).
- Determination level of serum globulin: The level of serum globulin was calculated by subtracting the albumin from the total protein [9].
- Determination level of serum urea nitrogen in blood: Measure the serum urea nitrogen level in serum using Syrbio's kit.
- Determination of the enzyme alanine (ALT): The efficacy of the enzyme was estimated using the kit prepared by the British company (RANDOX).
- Determination of creatinine in serum level: creatinine level was measured according to the Jaffs reaction principle and using the kit supplied by RANDOX.

2.1 statistical analysis

Results were statistically analyzed using the Sigma State program. For Windows Version 3.10 Copyright © 2004 Sytat, the Mean and standard error are estimated. The analyzes were analyzed using the one way analysis of variance, and the differences between the groups were determined using the Duncan multiple range test. The mean difference of

all tests was at the probability level ($P \leq 0.05$).

3. Results

Of the 10 blood samples collected from local cows , 5 cows (50%) was infected with fashilliosis and 5 cows (50%) was no infected . in the physiological parameters (Red blood cells, White blood cells, Hemoglobin concentration, Packed cell volume) we noted that the number of RBCs in the infected group decreased significantly (4.37×10^6 (in comparison of non-infected group (6.41×10^6 (. Regarding total number of white blood cells (9.43×10^3) increased significantly in infected group in comparison with non-infected group (5.51×10^3). Hb also measured in our study and we noted that the level of Hemoglobin concentration in the infected group (9.45) decreased significantly if we compare it with non-infected group (12.54). With regard the P.C.V in the infected group decreased significantly (32) while in non-infected group (37) . regarding the biochemical parameters (Total protein, Albumen, Globulin, Blood urea nitrogen, ALT activity and Creatinine) we noted that the level of Total protein (5.23) , Albumen (1.76), Globulin (3.45) and Blood urea nitrogen (21.16) decreased significantly in the infected group in comparison with non-infected group . while level of ALT (85.21) and Creatinine (1.95) were increased significantly in the infected group in comparison with non-infected group .

Table (1) : Effects of fashilliosis on blood parameters (red blood cells, white blood cells, hemoglobin concentration, Packed cell volume) in both groups

Parameters	Groups (Mean \pm S.D)	
	infected	Non infected
RBC ($\times 10^6$ cell/ml ³)	4.37 \pm 1.23 b	6.41 \pm 0.82 a
WBC ($\times 10^3$ cell/ml ³)	9.43 \pm 2.96 a	5.51 \pm 1.32 b
Hb (gm/ml)	9.45 \pm 0.87 b	12.54 \pm 0.65 a
PCV (%)	32 \pm 0.65 b	37 \pm 0.96 a

Significant difference at ($P \leq 0.05$)

Values are given as mean \pm SD

Differences in the letters in the row is indicator to the difference in significant

Table (2) : Effects of fashilliosis on biochemical parameters (total protein, albumin, globulin, urea nitrogen, ALT, and creatinine) in both group

Parameters	Groups (Mean \pm S.D)	
	infected	Non infected
Total protein (gm/100ml)	5.23 \pm 0.34 b	7.72 \pm 0.56 a
Albumen (gm/100ml)	1.76 \pm 0.65 b	3.13 \pm 0.52 a
Globulin (gm/100ml)	3.45 \pm 0.87 b	4.16 \pm 0.94 a
Blood urea nitrogen (gm/L)	21.16 \pm 4.12 b	43.46 \pm 6.75 a
ALT activity (I.U)	85.21 \pm 7.89 a	43.56 \pm 4.32 b
Creatinine (gm/L)	1.95 \pm 0.21 a	1.12 \pm 0.32 b

significant difference at ($P \leq 0.05$)

Values are given as mean \pm SD

Differences in the letters in the row is indicator to the difference in significant

4. Discussion

It was found in our study that the infection of liver worms in cows caused changes in physiological and biochemical parameters, especially in the spring season . When comparing our current study with the study conducted by researcher [10] . we note the researcher reported that incidence of liver worms affected by the seasons of grazing as these worms are active in spring season due to the growth and development of herbs and their containment of the

central host (snails), which is very difficult to control the spread of these snails in addition to mismanagement by animal breeders. In this study, the incidence of liver worms was significant in both the total number of red blood cells, the concentration of hemoglobin and the size of the cells. These results were in accordance with the researcher [11]. which showed that the infection of these worms causes anemia, Affects the blood picture of animal. The researcher [12] noted that the decline in

blood parameters in the incidence of this disease in ruminants is due to the severe loss of blood level due to obstruction of channels of bile caused by the presence of huge numbers of liver worms in those channels that cause severe anemia caused by acute inflammation in the Liver, leading to a reduction in the red blood cell count. This reduction is inversely proportional to the presence of pathogenic worms. Regarding white blood cells, it was noted in current study that the infected group recorded significantly increasing value than in the control group, The results agreed with the researcher [13] that reported the increase in the number of white blood cells is as a result of self-defense to the body that accompanies any infection, including infection of these worms. The researcher also found that the infection cause decrease in the red blood cells, Packed cell volume, and concentration of hemoglobin in animal infected with liver parasites is due to anemia caused by the absorption of large quantities of blood by the parasite in the channels of bile ducts, in addition to infection the parasites has ability to absorb blood and causes A decrease in the level of iron, which is an important element in the formation of hemoglobin and eventually decrease in the red blood cells formation . Our results also agreed with [14,15] who reported that the infection of liver parasites cause an increase in the number of white blood cells, which is increasing in the infection with any disease as an immune response to the disease whether the disease bacterial, viral or parasitic.

The results showed that the total protein level in the infected group was significantly lower than the control group. Our results were consistent with 16, which was due to anemia due to liver parasites, jaw syndrome, causing dysfunctional eating

and chewing of feed and then a breakdown of the liver, which in turn interrupts the manufacture of proteins. The findings of the researcher [17] that the infection parasites caused a decrease in the level of proteins in general, including albumin and globulin, and this is due to the destruction of liver tissue that lead to a defect in the production of proteins or non-manufacturing in the case of severe injuries that cause blockage of bile ducts due to the migration Large numbers of immature parasites during liver tissue. On the contrary, our results differed with the researcher [18] who found in his study a significant increase in the level of collobiolin because of increased production as an immune response to the disease.

The results of the study showed that the liver enzyme (ALT) increased significantly in the parasite-infected group. The results we obtained it agreed with study of [19,20] researcher who reported that the destruction of the liver tissue caused an increase in the enzymes as an indicator of liver cell damage. The researcher explained that the reason for the rise of liver enzymes is due to the release of active oxygen species by the parasite parasites and the occurrence of the state of stress and then the damage to the liver cells and the rise of enzymes. The same reason that the cause of the rise is due to necrosis of hepatic cells due to the migration of immature worms during the tissue of the pancreatic parenchyma of the liver in addition to cellular changes because parasitic parasitism causes increased permeability of liver cells and then release the enzymes to the serum causing an increase in levels as the height is an indicator Chronic diseases. Of the criteria measured in our current study are burea and blood nitrogen (BUN) and creatinine, which recorded a significant increase in the

infected group compared to control group and agreed with the results obtained with [21], which is due to the diseases that affect the urinary system, The liver injury with parasites cause disturbance in the production of proteins and kidney are affected by the imbalance in the production of proteins and then increase the level of urea nitrogen blood and creatinine.

Conclusion:

This study showed that the infection of liver worms had a negative impact on the blood picture as a whole , and it's a good indicator of the infection diagnosis .

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دراسة فسلجية وكيموحيوية لدم الأبقار المحلية المصابة بالديدان الكبدية في مزارع مدينة

سامراء

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الملخص

اجريت الدراسة الحالية في مدينة سامراء لمعرفة التغيرات في المعايير الفسلجية والكيموحيوية المصاحبة للإصابة بديدان الكبد في الأبقار. إذ استخدمت (10) بقرات في هذه الدراسة قسمت الى مجموعتين, ضمت المجموعة الاولى (5) بقرات مصابة اما المجموعة الاخرى فقد ضمت (5) بقرات سليمة عدت كمجموعة سيطرة. تم سحب عينات دم من كلا المجموعتين وتم قياس المعايير الفسلجية (كريات الدم الحمر, كريات الدم البيض, تركيز خضاب الدم, حجم خلايا الدم المرصوفة) اما المعايير الكيموحيوية التي تم قياسها فكانت (البروتين الكلي, الالبومين, الكلوبولين, خميرة الانلنن ناقله الأمين, يوريا نتروجين الدم والكرياتينين). بينت النتائج أن كل من (كريات الدم الحمر, كريات الدم البيض, تركيز خضاب الدم, حجم خلايا الدم المرصوفة) سجلت ارتفاعاً معنوياً ($P \leq 0.05$) في المجموعة السليمة بالمقارنة مع المجموعة المصابة ما عدا كريات الدم البيض فإنها سجلت انخفاضاً معنوياً في المجموعة السليمة بالمقارنة مع المجموعة المصابة. اما بالنسبة لكل من (البروتين الكلي, الالبومين, الكلوبولين, يوريا نتروجين الدم) فقد سجلت انخفاضاً معنوياً في المجموعة المصابة بالمقارنة مع المجموعة السليمة بينما سجل كل من (خميرة الانلنن ناقله الأمين و الكرياتينين) انخفاضاً معنوياً في المجموعة السليمة اذا ما قورنت بالمجموعة المصابة. نستنتج من هذه الدراسة ان الإصابة بديدان الكبد قد أثر تأثيراً سلبياً على الصورة الدموية وبعض المعايير الكيموحيوية في الحيوانات المصابة وهذا يعد مؤشراً خطيراً على تدهور صحة الحيوان وتأثيراً سلبياً على منتجاته