



Clinical and hemato-biochemical studies in Awassi lambs infected with coccidiosis.

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Abstract

The study was conducted on 95 lambs, divided into two groups depending on clinical signs, 55 lambs were clinically healthy and 40 lambs had bloody diarrhea and their feces had oocysts of *Eimeria* species. "Blood samples were collected from the jugular vein" into EDTA tubes for hematological value and plain tubes to separated sera were directly used for chemical investigation during January 2016 until April 2016 both groups aged 1 – 6 month in Najaf province.

Results showed that the ranges and means \pm SE of blood picture in healthy and infected with coccidia lambs were as follows; packed cell volume (PCV) 33.5 ± 0.47 % and 23.9 ± 0.46 %, hemoglobin (Hb) 10.9 ± 0.17 g/dL and 6.8 ± 0.12 g/dL, red blood cell (RBC) $10.6 \pm 0.15 \times 10^6 / \mu\text{L}$ and $8.8 \pm 0.24 \times 10^6 / \mu\text{L}$, mean cell volume (MCV) 31.6 ± 0.37 fL and 27.5 ± 0.59 fL, mean cell hemoglobin (MCH) 10.3 ± 0.14 pg and 7.9 ± 0.15 pg, mean cell hemoglobin concentration (MCHC) 32.7 ± 0.16 g/dL and 28.8 ± 0.34 g/dL, erythrocyte sedimentation rate (ESR) 9 ± 0.54 mm/24h and 19.1 ± 2.10 mm/24h, white blood cell count (WBC) $9231 \pm 379.3 / \mu\text{L}$ and $13707 \pm 562.8 / \mu\text{L}$, lymphocytes (L) $55.8 \pm 1.27 / \mu\text{L}$ and $43 \pm 1.46 / \mu\text{L}$, neutrophils (N) $30.6 \pm 0.76 / \mu\text{L}$ and $40.6 \pm 2.25 / \mu\text{L}$, monocytes $0.9 \pm 0.10 / \mu\text{L}$ and $2.2 \pm 0.30 / \mu\text{L}$, eosinophil's $1.9 \pm 0.27 / \mu\text{L}$ and $5.2 \pm 0.64 / \mu\text{L}$, basophils $0.3 \pm 0.05 / \mu\text{L}$ and $0.3 \pm 0.07 / \mu\text{L}$ respectively. Serum analysis in healthy and infected with coccidia lambs were as follows; iron $27.2 \pm 0.75 \mu\text{mol/L}$ and $11.4 \pm 0.59 \mu\text{mol/L}$, copper $18.4 \pm 0.74 \mu\text{mol/L}$ and $10.3 \pm 0.50 \mu\text{mol/L}$ respectively.

There were a significant decrease ($P < 0.05$) in, RBC, Hb, PCV, MCH, MCV, MCHC and lymphocyte. Also, there were a significant increase ($P < 0.05$) in WBC, ESR, neutrophils, eosinophil's and monocyte count was observed in all lamb infected with coccidiosis. On the other hand, there were a significant decrease ($P < 0.05$) in iron and copper in all lamb infected with coccidiosis.

The research concluded that lamb coccidiosis was associated with bloody diarrhea, tenesmus, anemia, hemoconcentration, leucocytosis, neutrophilia, eosinophilia, and a reduction in serum iron and copper.

Key words: Lambs, coccidiosis, hematological parameters, serum biochemistry.

دراسة العلامات السريرية والتغيرات الدموية كيموحيوية في الأغنام المصابة بالكوكسيديا

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الخلاصة:

اجريت الدراسة على 95 حمل قسمت الى مجموعتين اعتمادا على العلامات السريرية, 55 حمل سليم و 40 حمل مصاب بالإسهال الدموي وبرازها كان يحتوي على بيوض اليميريا. جمعت عينات الدم من الوريد الوداجي في انابيب حاوية على مادة مانعة التخثر لإجراء الفحوصات الدموية وقسم من الدم الى انابيب خالية لعزل مصل الدم لإجراء الفحوصات الكيموحيوية خلال الفترة من كانون ثاني 2016 وحتى نيسان 2016 في محافظة النجف الاشراف وكلتا المجموعتين بعمر 1-6 شهر. اظهرت النتائج للمعدلات \pm الخطأ القياسي في الحملان السليمة والحملان المصابة بالكوكسيديا كما يلي: حجم الخلايا المرصوص $33.5 \pm 0.47\%$ و $23.9 \pm 0.46\%$, خضاب الدم 10.9 ± 0.17 غم/دسي لتر و 6.8 ± 0.12 غم/دسي لتر, العد الكلي لكريات الدم الحمراء $10.6 \pm 0.15 \times 10^6$ مايكرولتر و $8.8 \pm 0.25 \times 10^6$ مايكرولتر, معدل الحجم الكاربي 31.6 ± 0.37 فمتولتر و 27.5 ± 0.59 فمتولتر, معدل خضاب الدم الكاربي 10.3 ± 0.14 بيكوغرام و 7.9 ± 0.15 بيكوغرام, معدل تركيز خضاب الدم الكاربي 32.7 ± 0.16 غم/دسي لتر و 28.8 ± 0.34 غم/دسي لتر, معدل تثقل كريات الدم الحمراء 9 ± 0.54 ملي متر/24 ساعة و 19.1 ± 2.10 ملي متر/24 ساعة, العد الكلي لكريات الدم البيضاء 9231 ± 379.3 مايكرولتر و 13707 ± 562.8 مايكرولتر, الخلايا اللمفية 55.8 ± 1.27 / مايكرولتر و 43 ± 1.46 / مايكرولتر, الخلايا المتعادلة 30.6 ± 0.76 / مايكرولتر و 40.6 ± 2.25 / مايكرولتر, الخلايا وحيدة النواة 0.9 ± 0.10 / مايكرولتر و 2.2 ± 0.30 / مايكرولتر, الخلايا الحمضية 1.9 ± 0.27 / مايكرولتر و 5.2 ± 0.64 / مايكرولتر, الخلايا القاعدية 0.3 ± 0.05 / مايكرولتر و 0.3 ± 0.07 / مايكرولتر على التوالي. وتحليل المصل في الحملان السليمة والمصابة بالكوكسيديا كالاتي: الحديد 27.2 ± 0.75 مايكرومول/لتر و 11.4 ± 0.59 مايكرومول/لتر, النحاس 18.4 ± 0.74 و 10.3 ± 0.50 مايكرومول/لتر.

لوحظ ان هنالك نقصان معنوي ($p > 0.05$) في حجم الخلايا المرصوص, خضاب الدم, كريات الدم الحمراء, معدل الحجم الكاربي, معدل خضاب الدم الكاربي, معدل تركيز خضاب الدم الكاربي والخلايا اللمفاوية. كما لوحظ زيادة معنوية ($p > 0.05$) في معدل تثقل كريات الدم الحمراء, كريات الدم البيضاء, الخلايا المتعادلة, الخلايا وحيدة النواة والخلايا الحمضية مع عدم وجود فرق معنوي في الخلايا القعدة. من جهة اخرى كان هناك نقصان معنوي ($p < 0.05$) للحديد والنحاس في الحملان المصابة بالكوكسيديا. استنتج من البحث بانه الحملان المصابة بالكوكسيديا كانت مصاحبة لها تشنجات مع اسهال دموي, فقر دم, زيادة لزوجة الدم مع زيادة العد الكلي لكريات الدم البيضاء والعدلات والحمضات مع نقص في نسب الحديد والنحاس في مصل الدم.

الكلمات المفتاحية: حملان, المعايير الدموية, الكيموحيوية, الكوكسيديا.

Introduction

Coccidiosis is a disease of livestock with a worldwide distribution (1). *Eimeria* are classified within subfamily Eimeriinae of the phylum Apicomplexa (2).

Many *Eimeria* spp. have been shown to be capable of creating clinical illness in

sheep characterized by diarrhea, loss of weight, low productivity, high morbidity, as well as high mortality rates depending on which *Eimeria* spp. is dominant (3). Stress factors such as weaning, inclement weather, dietary changes, traveling and regrouping

have important roles in ovine coccidiosis (4).

Oocysts of *Eimeria* spp. are present normally scanty in the feces of healthy sheep. The outbreaks, called coccidiosis, it occur when susceptible host are exposed to infective stage of pathogenic species. The severity of signs depends on the size of the infecting dose and the susceptibility of the host (5).

The diarrhea lasts for one or more weeks and sometimes ends fatally (6). However, at the same time, older sheep on the farm do not develop clinical coccidiosis, indicating that adult sheep have at least some immunity to the disease (5).

The general clinical findings of coccidiosis in sheep include depression, inappetance, grinding of teeth and abdominal pain. The feces become watery, blood tinged, mucoid or containing blood clots. Affected animals sometimes suffered tenesmus. In addition, anemia, emaciation and dehydration were recorded (7).

Hematological changes recorded with coccidiosis included a reduction in erythrocyte count (RBCs), PCV and Hb (8). In addition, the disease is associated with leukocytosis, eosinophilia and neutrophilia (9).

The serum biochemical changes associated with sheep coccidiosis included a reduction in copper (10). This work aimed at recording the main clinical findings associated with coccidiosis among lambs and determination of the hemato-biochemical changes associated with this problem.

Materials and methods

Ninety five blood samples collected and placed in EDTA tubes from jugular vein divided in to two groups depending on clinical signs 55 lamb clinically normal and 40 lamb infected with coccidia in AL- Najaf province- Iraq.

The blood used directly for detection the complete blood picture (CBC). packed cell volume (PCV) is measured by using micro hematocrit centrifuge according to (11). The Hb was converted into cyanmethaemoglobin by using drabkins reagent and measured by spectrophotometer (12).

Erythrocytes and leukocytes counts were evaluated by hemocytometer method according to (13). while, hematological indices; MCV, MCH and MCHC calculated according to the following formulae :

$$\text{MCV fl} = \text{PCV} / \text{RBCs} \times 10$$

$$\text{MCH pg} = \text{Hemoglobin} / \text{RBCs} \times 10$$

$$\text{MCHC (g/dL)} = \text{Hemoglobin} / \text{PCV} \times 100$$

(13). Moreover, blood specimens estimated for ESR using westegren tubes, blood withdrawn to mark (0) and the tubes stand vertically on the rake (14). The ESR values recorded in mm after 24 hrs. Blood films were made and stained using Giemsa stain according to (13). However, 100 leukocytes used for the DLC.

The serum iron was measured by atomic absorption spectrophotometers (15), while copper level in serum was evaluated by method mentioned by Abe (16). Fecal samples were collected from the total lambs.

The fecal sample (5g) were collected either directly from rectum or immediately after defecation in a plastic container. Fecal samples were examined by floatation with Sheather's solution for the presence of oocyst (17).

Statistics

All data were analyzed statically by SPSS version 20. The least significant differences test (LSD) was used to determine differences among groups. Data were subjected to analysis of variance statistically using one-way ANOVA and the Duncan range test (Statistic a).

Results And Discussion

Hematological changes of diseased lambs (table 1) included a significant decrease ($P<0.05$) of RBC count, PCV, Hb, MCV, MCH and MCHC. This result was in accordance with those recorded previously by several investigations (9, 18).

The significant decrease of RBCs and Hb content might be qualified to the hemorrhagic enteritis related with coccidiosis (19). An increase in ESR due to hypoproteinemia resulting from blood loss and digestive disturbance of the present studies are accordance with those of (20).

Coccidiosis in lambs is an intestinal infection manifested clinically by diarrhea and dehydration. In this study, clinical examination of diseased lambs revealed depression, reduced appetite, pale mucous membrane watery diarrhea with feces frequently containing blood and mucus,

tenesmus and dehydration. These signs were similar to those previously reported (9).

The normal reference range of PCV, Hb, RBC and WBC obtained in the present study agreed with the range of healthy sheep by (21, 22). Although, normal physiological parameters of various blood values of animals are affected by many factors such as breed, sex, age, nutrition, season, climate, altitude and environmental habits of the species state (23).

In this study, diseased lambs had leukocytosis with significant increase ($P<0.05$) in neutrophils and eosinophil's (table 1). This result was in agreement with a previous study (9) that referred these changes to enteritis. The lymphocytopenia demonstrated in this study may be attributed to lymphocyte depletion and atrophy in follicles of ileal Peyer's patch (24).

Table (1). The hematological parameters for normal and infected lambs with coccidiosis; ranges and means \pm SE.

Parameters	Groups	
	Normal lambs (n=55)	Lambs coccidiosis (n=40)
PCV(%)	(28-43) 33.5 \pm 0.47 A	(15-27) 23.9 \pm 0.46 B
Hb(g/dL)	(8.6-15.1) 10.9 \pm 0.17 A	(4.5-8.0) 6.8 \pm 0.12 B
RBC $\times 10^6/\mu$ L	(8.9-14.1) 10.6 \pm 0.15 A	(5.6-11.9) 8.8 \pm 0.24 B
MCV(fL)	(27.7-36.9) 31.6 \pm 0.37 A	(22.3-38.9) 27.5 \pm 0.59 B
MCH(pg)	(8.5-12.3) 10.3 \pm 0.14A	(5.7-10.8) 7.9 \pm 0.15B
MCHC(g/dL)	(30.6-35.4) 32.7 \pm 0.16 A	(24.8-34.5) 28.8 \pm 0.34 B
ESR mm/24h	(3-17) 9 \pm 0.54 B	(6-59) 19.1 \pm 2.10 A
WBC(/ μ L)	(3900-13000) 9231 \pm 379.3 B	(7050-23550) 13707 \pm 562.8 A
Lymphocytes	(32-71.3) 55.8 \pm 1.27 A	(13.5-63) 43 \pm 1.46 B

Neutrophils	(21.5-44) 30.6±0.76 B	(15.5-73) 40.6±2.25 A
Monocytes	(0.5-4) 0.9±0.10B	(0-6.5) 2.2±0.30A
Eosinophil's	(0-8) 1.9±0.27B	(0-20) 5.2±0.64A
Basophils	(0-1.5) 0.3±0.05A	(0-1.5) 0.3±0.07A

The differences in capital letters horizontally refer to the presence of significant value at ($p<0.05$).

Biochemical serum analysis for lambs with coccidiosis (table 2) demonstrated a significant decrease in Serum iron and copper levels, decreased with coccidiosis, a result that was observed in other studies (8).

The decrease in these parameters might be attributed to suppression of appetite associated with coccidiosis. On the other hand, serum iron level was significantly decreased, which could be attributed to the bloody diarrhea and the inappetence occurring concurrently with eimeriosis (10).

Table (2). The biochemical parameters in normal and lambs with coccidiosis ; ranges and means± SE.

Parameters	Groups	
	Normal lambs (n=55)	Lambs coccidiosis (n=40)
Iron $\mu\text{mol/L}$	(17.8-42.9) 27.2±0.75 A	(3.5-17.1) 11.4±0.59 B
Copper $\mu\text{mol/L}$	(10.7-33.1) 18.4±0.74 A	(3.3-15.6) 10.3±0.50 B

The differences in capital letters horizontally refer to the presence of significant value at ($p<0.05$).

In a conclusion, lamb coccidiosis was associated with bloody diarrhea, tenesmus, anemia, haemoconcentration, leucocytosis, neutrophilia, eosinophilia, and a reduction in serum iron and copper.

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