

Diagnostic and Hematological Study in Sheep Infected With Gastrointestinal Nematode in Mosul City

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Abstract

The aim of this study was to investigate the infection rates as well as the types of Gastrointestinal worms in local sheep admitted to the veterinary teaching hospital at the University of Mosul from the beginning of March 2021 until the end of August 2021, the study also included the effect of Gastrointestinal worms on blood picture in affected animals, 120 faeces and blood samples were collected from native sheep, 12 sheep were clinically normal and negative for gastrointestinal tract parasites and served as control, the results of laboratory examination of faeces samples showed 80 (120) samples were positive for Gastrointestinal worms with a total of infection rate 66.66%, Infection with eggs of *Marshallagia* spp represented the highest rate of infection amounting to 50 %, followed by infection with eggs of *Ostertagia* spp at a rate of 17.5 %, while the percentage of infection with eggs of *Haemonchus* spp. was 15%, *Oesophagostomum* spp. *Nematodirus*.spp, *Trichostrongylus* Spp had the lowest infection rates(7.5,5.5) % respectively. Blood pictures of infected animals showed a significant decrease ($P<0.05$) in Red Blood Cell count (RBC), Pack Cell Volume (PCV), and Hemoglobin (Hb), with a significant increase ($P<0.05$) in Mean Corpuscular Volume (MCV), without significant changes in mean corpuscular haemoglobin concentration (MCHC) values, compared with a control group, while ESR values increased significantly in infected animals compared with control, the Result was showed a significant increased in Total leucocyte count with eosinophilia and lymphocytosis. These results showed the wide spread of Gastrointestinal worms infection in sheep in Mosul city, in addition to its effect on the blood picture.

Keywords: GIT, Parasites, Hemogram, Sheep

دراسة تشخيصية ودموية في الاغنام المصابة ببعض الديدان المعوية الاسطوانية في مدينة الموصل

الخلاصة

هدفت هذه الدراسة إلى تقصي معدلات الإصابة وكذلك الكشف عن أنواع الديدان المعوية الاسطوانية في الاغنام المحلية الواردة إلى المستشفى التعليمي البيطري في جامعة الموصل منذ بداية شهر آذار 2021 ولغاية نهاية آب 2021 ، كما شملت الدراسة تأثير الديدان المعوية على صورة الدم في الحيوانات المصابة، حيث تم جمع 120 عينة براز ودم من الاغنام المحلية منها 12 عينة جمعت من اغنام سليمة سريريا وكانت سالبة الاصابة بالديدان المعوية استخدمت كمجموعة سيطرة ، أظهرت نتائج الفحص المختبري لعينات البراز أن 80 من مجموع 120 عينة كانت موجبة الاصابة بالديدان المعوية بإجمالي معدل إصابة بلغ 66.66%، شكل الخمج ببيض طفيلي *Marshallagia* spp أعلى نسبة اذ بلغت 50%، تلتها بيوض طفيلي *Ostertagia* spp. بنسبة 17.5%، في حين كانت النسبة المئوية للتطفل في بيوض *Haemonchus* spp. 15% ، *Oesophagostomum* spp. ، *Nematodirus*.spp *Trichostrongylus* Spp كان لديها أدنى معدلات الخمج (5,5,7.5) % على التوالي . بينت نتائج الصورة الدموية في الاغنام المصابة بالديدان المعوية انخفاضا معنويا ($P<0.05$) في عدد كريات الدم الحمراء RBC وحجم خلايا الدم المرصوفة PCV بالإضافة الى كمية خضاب الدم HB وحدوث زيادة معنوية في معدل حجم كريات الدم الحمراء MCV ولم يلاحظ اي تغيير معنوي في معدل تركيز خضاب الدم الكروي MCHC في حين لوحظ وجود الزيادة المعنوية في سرعة ترسيب كريات الدم الحمراء ESR في الاغنام المصابة مقارنة مع مجموعة السيطرة ، كما اشارت نتائج الدراسة حدوث تغيرات معنوية في عدد كريات الدم البيضاء حيث لوحظ زيادة المعنوية في العدد الكلي لكريات الدم البيضاء كما سجل زيادة معنوية في عدد الحمضات والخلايا اللمفاوية. استنتج من نتائج الدراسة الانتشار الواسع للطفيليات المعوية في اغنام مدينة الموصل، كما لوحظ التأثير الشديد لهذه الديدان على الصورة الدموية في الاغنام المصابة .

Introduction

The breeding of small ruminants such as sheep and goats occupies an important aspect of the economy, especially in the Iraqi economy, where it is considered an important source in the supply of food products, including meat, milk, dairy products and leather, the diseases affecting ruminants, mainly internal parasites such as Gastrointestinal worms lead to reduce the growth and prosperity of livestock and a significant economic losses through the severe and rapid decrease in the body weight of the infected animal, in addition to a severe reduction in the productivity of the infected animal, especially the production of milk, meat and wool (1). Mismanagement in sheep breeding and the lack of periodic use of anthelmintic treatments have led to increased rates of infection with internal parasites, the infection with stomach and intestinal worms especially of Nematodes led to several clinical signs in sheep as diarrhea, emaciation, loss of appetite (2). The life cycle of Nematodes may be direct or indirect (needs an intermediate host), and it includes several types, the most important of which are:

Ostertagia spp : called Brown stomach worms, Species of this genus inhabit the Abomasum and small intestine of sheep, goats and cows, the worms appear as thin and cylindrical shape (3), the eggs are shed with the feces and develop into the larval (L1) then to the second stage (L2) and finally to the (L3) (the infective stage of intact animals) (4).

Marshallagia spp : This species is found in the abomasum of sheep and other ruminants, the parasite causes severe abomasitis with formation of many nodules inside of Abomasum, each nodule containing about 3-4 developed parasites, the eggs have an elliptical shape with dissimilar poles (5).

Trichostrongylus spp : pale reddish-brown worms, The genus includes several species as

Trichostrongylus colubriformis, which inhabits the anterior part of the small intestine, and in some time in abomasum, The female lays an oval-shaped egg covered with a thin shell, (6).

Nematodirus spp: this type of worms are inhabit in small intestine of cows and sheep, the eggs are so large that their size immediately distinguishes them from other species, with dark colored blastomeres (7)

Haemonchus spp.: its commonly known as stomach or wire worm of ruminants, the male has red color, the female has a distinctive shape called barbers poles, the worms can suck blood in abomasum which leads to severe anemia and body loss and even death, the eggs have asymmetrical poles (8).

Oesophagostomum spp.: this parasite is inhabit in the large intestine of sheep, the adult female is longer than adult male, the eggs have symmetrical poles (9).

The pathological effect of gastrointestinal parasites on mucosa of intestine and abomasum lead to Malabsorption and finally may be effect on the blood picture, Therefore this study was developed to investigate the effect of gastrointestinal parasites on the blood picture.

Materials and methods

The study was conducted on 120 local breed sheep, with different ages, admitted to the veterinary teaching hospital at the University of Mosul from the beginning of March 2021 until the end of August 2021, 12 sheep were clinically normal - negative for GIT parasite and served as control. 5 ml of blood samples were collected from jugular vein by using a sterile syringe then the blood were putted in Ethylene Diamine Tetra acetic Acid (EDTA) tube for evaluation of Blood Picture (RBC, HB, PCV, MCV, MCHC, TLC), all these categories were estimated by using of (automatic digital cell counter), while differential leukocyte counts were estimated by using blood

smears stained by leishman stain (10).the values of ESR was determined by using of Westergren method(11). The fecal samples were collected directly from rectum by using a sterile gloves and examined in the laboratory of Veterinary Teaching Hospital by using of direct and flotation methods (12). The length and width of the eggs were measured by using of Ocular Micrometer.

Statistical analysis: SPSS statistical program and T test were used to analyze of blood picture results between infected sheep and control group (healthy sheep) (13).

Results and Discussion

The infected animals suffered from several clinical signs as emaciation with pale mucous membrane , loss of appetite ,diarrhea, easy detach of wool (main clinical signs of sheep infected with Gastrointestinal parasites) these clinical signs were agreement with (14).

Eighty animals out of one hundred and twenty were positive with internal parasites (Gastrointestinal parasites) with a total of infection rate 66.66% Table (1) , the reason of high infection percent may be belong to lack of periodic use of anthelmintic treatments.

The highest rate of infection was reported in infection with eggs of *Marshallagia spp*, while the lowest infection rate was 5% with eggs of *Trichostrongylus Spp.* and *Nematodirus spp.* Table (2) the results were agreement with (15) where explained the reason of the low rates of infection with types of worms that inhabit the intestines compared to those that inhabit the stomach or abomasum to the environmental and climatic conditions that play an important role in the negative impact on the development of certain types of worm eggs, in addition to the fact that the acidic environment of the stomach or abomasum is suitable for the adaptation of worms and follow-up of their development.

The dimensions of worm eggs were measured by using of Ocular Micrometer Table (3).

The results of blood picture was showed a significant decrease ($P < 0.05$) in erythrocyte count and hemoglobin concentration as well as of pack cell volume in infected sheep compare with control group , Table (4) and this result is indicated to occurrence of Anemia, there are many interpretation to occurrence of anemia in sheep which affected with Gastrointestinal parasites ,one of them may be copper malabsorption , the copper which consider very important for RBC synthesis (16),some parasites as *Haemonchus spp.*cause ulceration and hemorrhage of abomasum and finally lead to anemia . the type of anemia was macrocytic normochromic anemia (increase in MCV with no significant changes in MCHC values in diseased animal compared with control group) Table (4), the result was agreement with (17) , the results were showed a significant increase ($P < 0.05$) in erythrocyte sedimentation rate that agreement with (18) who mentioned that erythrocyte sedimentation rate value is increase when the red blood cell (RBC) decreased in its numbers . the total leukocyte count was increased significantly ($P < 0.05$) in infected sheep compare with healthy sheep the result was agreement with (17,19) the cause of leukocytosis may be due to increase of lymphocyte and eosinophil count , Eosinophilia occurs as a result of sensitivity to the protein of parasites, especially sensitivity to the protein of the larvae during their migration . on the other hand lymphocytosis may be due to a response of immunity system to produce an anti-parasitic antibodies in the serum.

Table (1) Total percentage of Gastrointestinal nematode infection in sheep

Number of examined sheep	Number of infected sheep	Percentage of infection
120	80	66.66 %

Table (2) Percentages of infection with Gastrointestinal nematode out of 80 positive samples

Diagnosed parasite eggs	Number of infected sheep	Percentage of infection(%)
<i>Marshallagia spp.</i>	40	50
<i>Ostertagia spp.</i>	14	17.5
<i>Haemonchus spp.</i>	12	15
<i>Oesophagostomum spp.</i>	6	7.5
<i>Nematodirus spp.</i>	4	5
<i>Trichostrongylus spp.</i>	4	5
	80	100

Table (3) Dimensions of diagnosed Nematodes eggs

Egg of parasite	Length (µm)	Width (µm)
<i>Ostertagia spp.</i>	80-88	48-52
<i>Marshallagia spp.</i>	125-190	72-85
<i>Haemonchus spp.</i>	62-95	36-50
<i>Oesophagostomum spp.</i>	75-98	46-58
<i>Nematodirus spp.</i>	130-200	70-90
<i>Trichostrongylus spp.</i>	55-98	50-54

Table (4) blood parameter in infected sheep compare with control group

Parameters	Mean ± Standard Error	
	Control group	Diseased sheep
RBC (10 ⁶ /µl)	9.52±0.48	4.96±0.35*
Hb (g/dL)	10.23±0.42	7.31±0.19*
PCV (%)	34.58±0.84	24.01±1.82*
MCV (fl)	36.32±0.40	48.55±0.98*
MCHC (g\ dL)	29.51± 1.08	30.44±1.47
ESR (\ 24 hours)	2.76±0.23	5.92± 3.45*
TLC (×10 ³ µL)	9.17±0.04	13.47±1.26*
Neutrophils (%)	24.31± 0.19	23.02±1.32
Lymphocytes(%)	67.51 ± 0.81	71.13 ±2.31*
Eosinophils (%)	2.35±0.07	5.01 ± 0.02*
Basophils (%)	0.30±5.71	0.29±0.09
Monocytes (%)	3.80±4.12	2.03±3.61

*significant values (P<0.05)

Conclusion

The current study showed the high percentage of Gastrointestinal parasite infection in sheep in Mosul city specially of *Marshallagia spp.* Infection , as well as the study showed many changes in blood parameters of sheep which infected with Gastrointestinal parasite.

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