

Clinico-Biochemical Changes Associated with Bloody Diarrhoea of Lambs with Special Respect to Coccidiosis

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Abstract

This study was carried out on 18 lambs collected from Moshtohour village at Kaulubia governorate, five of them were clinically normal and free from internal and external parasites, while the remaining 13 lambs suffered bloody diarrhoea and their faeces had vegetative cells and oocysts of *Eimeria* species. Hematological picture indicated significant decrease of erythrocytic count and HB concentration, while there was significant increase of PCV% and total leucocytic count. Differential leucocytic count showed neutrophilia, lymphopenia, and eosinophilia. Serum analysis revealed significant decrease of sodium, iron, zinc, chloride, bicarbonate and total protein levels, with significant increase of potassium, total bilirubin levels, alanine aminotransferase, aspartate aminotransferase, gamma-glutamyl transferase and alkaline phosphatase activities. Also there were no changes of serum calcium, glucose and copper levels. Treatment of coccidiosis of lambs with sulfadimethoxine was more effective and faster than amprolium treated lambs.

Introduction

Enteric diseases are most commonly manifested by diarrhoea and can result in significant mortality or economic losses from reduced conditions, (*Mottelib et al., 1993*). Ovine coccidiosis is one of the causes of haemorrhagic enteritis. Its importance is contributed to reduction of body weight, inefficient feed utilization and deaths of severely affected animals, (*Radostitis et al., 1995*). The disease is caused by protozoon parasite of Genus *Eimeria*, (*Georgi, et al., 1982*) which is characterized by a sporulated oocysts with 4 sporocysts and each of them has two sporozoites, (*Ernst and Benz. 1986*). Coccidiosis in lambs was always due to mixed *Eimeria* infestation and three species of *Eimeria* at least were recorded from each diarrheic lambs. Generally eight species of *Eimeria* were recognized including *E.Parva*, *E.Granulosa*, *E.Ovinodalis*, *E.Ovina*, *E.Faurei*, *E.ashata*, *E.Pallida* and *E.intricata*, (*Aly, 1990*). The different species of *Eimeria* had get a selective location in the intestinal tract, (*Ayaub, 1994*). The clinical findings of coccidiosis included depression, inappetance, grinding of the teeth, and abdominal pain. The faeces become watery, blood tinged mucoid or containing blood clots and affected animals some times suffered tenesmus. Anemia, weakness and dehydration were other additional clinical findings, (*Soulsby, 1968 and Levine and Ivens, 1970*).

Concerning the haematological changes associated with haemorrhagic enteritis caused with coccidia. *Pout and Harbutt (1968)* recorded haemoconcentration in lambs with coccidiosis. *Svanbaev and Gorbunova (1969)* detected reduction in total erythrocytic count and hemoglobin concentration in lambs infested with *E.ninakohylakimovae*. *Semenov (1973)* registered an increase in eosinophils and neutrophils percentage of lambs infested with mixed oocysts of coccidia. *Rama et al. (1978)* found a fall in RBCs count and hemoglobin concentration with an increase in the proportion of lymphocytes and neutrophils in lambs experimentally infested with *E.Parva* and *E.ninakohylakimovae*. *Shommein and Osman (1980)* recorded reduction in RBCs count and hemoglobin concentration, with an increase of MCV and PCV in goats infested with coccidia. Differential leucocytic count showed eosinophilia and moderate increase of the lymphocytic series. *Deghidy, et al. (1984)* reported an increase of both RBCs count and hemoglobin content and leucocytosis due to eosinophilia and significant increase of monocytes in sheep with coccidiosis. *Hayat et al. (1990)* found a decrease in RBCs count, PCV, hemoglobin concentration and means corpuscular hemoglobin concentration, with an increase in erythrocyte sedimentation rate and the mean corpuscular volume in sheep experimentally infested with coccidia. With regard to biochemical changes with coccidiosis, *Svanbaev and Gorbunova (1969)* reported falling in chloride and glucose contents of blood of lambs infested with coccidia. *Aly (1990) and Litvinskii (1981)* recorded significant increase of serum bilirubin, SGOT and SGPT activities while significant decrease of serum alkaline phosphate in sheep with coccidiosis. *Shommin and Osaman (1980), Begum and Anwar (1981), Ister et al. (1987) and Aly (1990)* observed that sheep with coccidiosis had significant decrease in serum sodium, phosphorus, calcium and copper, while significant increase in serum potassium levels.

With regards to treatment, symptomatic treatment including fluid therapy with saline and the use of hematinics as Iron preparation and vitamin B is essential to avoid complications of dehydration and anemia, *Radostitis et al. (1995)*. Specific treatment of coccidiosis was successfully attained by amprolium at dose of 0.05 gm / kg B.wt for 10 days, (*Hammond et al., 1967, Baker et al., 1972, Berkinbaev and Bisenova 1985 and Georgi and Georgi, 1990*). On the other hand *Mahrt (1969)* recorded that sulfonamides (sulphamerazine, sulphamethazine and sulphathiazole) when given in drinking water for 3 days followed by oxytetracycline for 2 days were affective for lambs suffering from coccidiosis. *Yvore et al. (1981) and Berkinbaev and Bisenova (1985)* found that animal treated with sulhadimethoxine with dose of 75 mg / kg. B.wt twice daily for 5 days had low oocysts count. *Gregory et al. (1982)* reported that addition of sulphdimidine to food and / or water reduced the oocyst output of ovine coccidiosis.

The aims of this work to solve this field problem among lambs by fulfilling the following points:

- Recording the clinical picture of this disease condition among lambs.
- Studying the side effect of this disease on the hematological and biochemical pictures.
- Evaluation and study the efficacy of two types of treatment against this diseases condition.
- Applying a symptomatic treatment to enhance general health condition among diseased lambs.

Material and Methods

The study was conducted on eighteen lambs, aging 16 weeks to 6 months, collected from different private grazing flocks at Moshtohour village in Qualubia- Governorate. All lambs were subjected to clinical examinations according to *Kelly (1984)*. Fecal examinations were carried for each lamb according to *Soulsby (1982)*. Five lambs were clinically healthy and proved to be free from both external and internal parasites and kept as control, while other infested lambs had bloody diarrhea. Two blood samples were drained from jugular vein; the first was taken with anticoagulant (EDTA) for blood picture (RBCs, HB, PCV, WBCs, and differential leucocytic count) estimation according to (*Jain, 1986*). The second sample was collected without anticoagulant and allowed to clot at room temperature for 2 hours, then centrifuged at 3000 rpm. Clear and non-hemolysed sera were collected for the determination of sodium and potassium using flame photometer CORNING Model 400 (England Essex). Serum levels of calcium, iron, Glucose, chloride, total proteins, total bilirubin, direct bilirubin, indirect bilirubin, activities of AST, ALT, Gamma-glutamyl transferase (GGT) and alkaline phosphatase were estimated colormetrically by Spectroplus D (England) according to *Tietz (1970)*, *Ramsay, (1958)*, *Howanitz and Howanitz (1984)*, *Bauere, (1982)*, *Bartholomew and Delaney, (1966)*, *Jendrassik and Grap (1938)*, *Reitman and Frankel (1957)*, *Moss, (1984)* and *Belfield and Goldberg (1971)*. Serum copper and zinc levels were estimated by using atomic absorption spectrophotometer (PERKIN-ELMER CO., USA), according to *Wooton and Freeman (1982)*. Therapeutic trials were conducted by dividing diseased animals into two groups:

Group 1: Included 7 lambs treated orally by amprolium with dose rate 67.5 mg / kg body weight for 14 days, (*Ross, 1968*).

Group 2: Involved 6 lambs treated orally twice daily with sulfadimethoxine 75 mg / kg B.wt for 5 days, (*Yvore et al., 1981*).

All diseased lambs had intravenous fluid therapy (saline solution) and hematinics for anemia treatment, ferrous sulphate orally at dose rate 2 mg/ kg body weight 3 times daily for one week after (*Reynolds, 1989*) and Vit. B complex by intramuscular injection as supportive treatment (*Radostits et al., 1995*).

The efficacy of the both drugs (Amprolium and Sulfadimethoxin) was estimated by examination and observation of the diseased lambs after treatment and by hematological and biochemistry assessment three weeks post-treatment.

Results and Discussion

The clinical inspection of diseased lambs revealed reduced appetite, depression, diarrhoea with faeces contained blood and threads of mucous, abdominal pain and pale watery visible mucous membranes. Fecal analysis showed vegetative cells and oocysts of *Eimeria* species. These findings were similar to those recorded by *Chapman (1974- a)* and *Berkinaev and Bisenova (1985)*. Hematological picture of diseased lambs (table. 1) revealed significant decrease of total erythrocytic count and haemoglobin content, while, there was significant increase of PCV% and total white blood cells. Differential leucocytic count indicated significant lymphocytopenia, significant neutrophilia and significant eosinophilia. These results were parallel with those of *Svanbaev and Gorbunova (1969)* who proved low total erythrocytic count and haemoglobin concentration in lambs infested with *E. ninakohylakimovae*. *Rama et al. (1978)* compared the hematological picture of lambs before and after infestation with *E. ninakohylakimovae* and registered falls in total erythrocytic count and haemoglobin concentration after infestation. *Berkinbaev and Bisenova (1985)* recorded anemia in

lambs experimentally infested with *E. ninakohylakimovae*. This significant decrease of RBCs and HB content might be due to haemorrhagic enteritis due to coccidiosis, (Deghidy *et al.*, 1984). The significant leucocytosis with significant lymphocytopenia, significant neutrophilia and significant eosinophilia was attributed to inflammatory condition of the intestine that was agreed with Deghidy *et al.* (1984) and Mottelib *et al.* (1993). The significant increase of PCV% was due to dehydration, which is agreed with Shommein and Osman (1980) and Mottelib *et al.* (1993). Serum analysis for lambs with coccidiosis (tables 2 & 3) indicated significant decrease of sodium level while significant increase of potassium level and significant decrease of chloride and bicarbonate levels. This may be attributed to the diarrhea associated with coccidiosis. These changes were similar to those of Svanbae and Gorbunova (1969) and agreed with Shommein and Osman (1990). Serum calcium, copper and blood glucose levels were slightly decreased with coccidiosis, which may be due to lower food intake associated with coccidia infestation. This result was coincided with that of Aly (1990). Serum iron level was significantly decreased and this result was parallel with that of Aly (1990). Also there was significant decrease of serum zinc level. These decreases may be attributed to secondary bacterial infection and mal- absorption from damaged intestine, (Deghidy *et al.*, 1984). The significant reduction in serum total protein in infested lambs may be attributed to integrated function of alimentary tract due to decreased absorption of nutrients from infection sites, damage caused by parasites and cell sloughing. These changes agreed with Catchpole and Gregory (1985). Also there were significant increase of serum bilirubin level, ALT and AST activities. This detection was similar to that of Ali (1990). Serum alkaline phosphatase was significantly increased and this coincided with that of Holst and Sevansson (1994) Serum GGT activity level was significantly increased. These changes of all previous enzymes with both total proteins and bilirubin levels pointed to that the liver might be affected by coccidiosis. There was significant decrease of chloride and bicarbonate levels, which was similar to that of Svanbae and Gorbunova (1969). The result of treatment of lambs with coccidiosis with amprolium and sulfadimethoxine indicated complete recovery that was completed by fluid therapy especially saline solution and hematinics. The efficacy of sulfadimethoxin was more potent than the efficacy of the Amprolium and all changed parameters nearly returned to normal values within three weeks post-treatment in second group treated by sulfadimethoxin more better and faster than in first group treated by Amprolium. This may be due to rapid responses of the lambs to the double and high doses of the sulfadimethoxin which lead lambs to retain normal appetite. This result was nearly similar to those of Ross (1968), Yvore *et al.* (1981) and Radostitis *et al.* (1995).

We concluded that treatment of lamb infected with coccidiosis by sulfadimethoxin was more potent and faster than those treated by Amprolium. Also applying of hygienic measures will reduce the incidence of infection by this disease.

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Table (1): Mean values of hematological picture of healthy and diarrhoeic lambs due to coccidiosis.

Hematological picture	Negative control lambs	Lambs		
		Before treatment	With After treatment in group (1)	Coccidiosis After treatment in group (2)
RBCs ($10^6 \times \text{ul}$)	11.83 \pm 0.42	7.54** \pm 1.08	10.59 \pm 0.14	10.51 \pm 0.26
Hb (gm/ dl)	12.63 \pm 0.15	7.41 ** \pm 0.41	12.02 \pm 0.21	11.97 \pm 0.17
PCV %	36.2 \pm 0.49	39.08 * \pm 1.52	36.14 \pm 0.47	37.43 \pm 0.37
WBCs ($10^3 \times \text{ul}$)	6.48 \pm 1.38	18.22** \pm 0.82	6.98 \pm 0.11	7.29 \pm 0.17
Neutrophiles %	26.8 \pm 0.67	44.6 ** \pm 3.41	27.65 \pm 0.44	28.70 \pm 0.62
Lymphocytes %	64.4 \pm 0.66	43.40** \pm 2.64	62.16 \pm 2.44	61.79 \pm 0.47
Basophils %	0.6 \pm 0.07	0.80 \pm 0.19	0.67 \pm 0.06	0.7 \pm 0.05
Monocytes %	5.00 \pm 0.21	4.60 \pm 0.20	4.25 \pm 0.20	4.79 \pm 0.15
Eosinophils %	3.20 \pm 0.20	6.6** \pm 1.01	5.27 \pm 0.24	4.02 \pm 0.12

* Values significant at $P < 0.05$.

** Values significant at $P < 0.01$.

Table (2): Mean values of some serum biochemical profile of healthy and diarrhoeic lambs due to coccidiosis.

parameters	Negative for coccidiosis (control)	Lambs with coccidiosis		
		Before treatment	After treatment in group (1)	After treatment in group (2)
Sodium (Meq/ L)	144.31 \pm 3.21	83.64* \pm 2.71	137.7 \pm 0.5	138 \pm 0.78
Potassium (Meq/ L)	7.22 \pm 0.12	9.53* \pm 0.08	7.69 \pm 0.10	7.5 \pm 0.12
Calcium (mg%)	9.23 \pm 0.38	8.74 \pm 0.93	9.03 \pm 0.10	9.03 0.04
Iron (mg / uL)	147 \pm 11.23	115.22* \pm 3.62	136.61 \pm 0.46	137.36 \pm 1.14
Copper (ug / dl)	183.97 \pm 11.7	165.01 \pm 3.47	177.71 \pm 2.05	178.14 \pm 2.33
Zinc (ug / dl)	115.10 \pm 2.77	64.8* \pm 0.48	111.60 \pm 0.63	112.75 \pm 0.8
Glucose (mg %)	62.11 \pm 3.15	48.2 \pm 3.71	57.64 \pm 0.39	58.23 \pm 0.31
Chlorides (Meq/ L)	95.11 \pm 2.54	60.81* \pm 1.28	84.57 \pm 1.67	86.33 \pm 1.3
Bicarbonates (Meq/ L)	30.29 \pm 0.42	14.81* \pm 0.61	27.62 \pm 0.68	28.47 \pm 0.61

* Values significant at $P < 0.05$.

** Values significant at $P < 0.01$.

Table (3): Mean values of some liver function parameters for healthy and diarrhoeic lambs with coccidiosis.

parameters	Negative for coccidiosis (control)	Lambs with coccidiosis		
		Before treatment	After In Group (1)	treatment both Group (2)
AST (IU/ L)	170.24 \pm 8.22	201.1* \pm 10.3	186.21 \pm 2.33	184.88 \pm 1.11
ALT (IU/ L)	22.35 \pm 1.78	28.12* \pm 2.08	24.51 \pm 0.68	23.57 \pm 0.51
γ - GGT (u / dl)	16.14 \pm 0.72	19.43* \pm 0.46	18.33 \pm 0.29	17.93 \pm 0.29
Alkaline phosphatase (u / dl)	17.54 \pm 0.58	32.60* \pm 0.46	20.13 \pm 3.42	18.84 \pm 0.50
Total bilirubin (mg %)	0.08 \pm 0.01	0.13* \pm 0.05	0.09 \pm 0.007	0.09 \pm 0.001
Direct bilirubin (mg %)	0.03 \pm 0.004	0.04 \pm 0.001	0.03 \pm 0.01	0.03 \pm 0.01
Indirect bilirubin (mg %)	0.05 \pm 0.02	0.09 \pm 0.01	0.08 \pm 0.01	0.06 \pm 0.007
Total protein (g/ dl)	8.01 \pm 0.26	6.22 * \pm 0.34	7.18 \pm 0.21	7.27 \pm 0.27

* Values significant at $P < 0.05$.

** Values significant at $P < 0.01$.