CLINICAL AND BIOCHEMICAL STUDIES IN SHEEP NATURALLY INFECTED WITH BABESIA IN ASSIUT GOVERNORATE

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ABSTRACT

The present study was conducted on one hundred and five adult sheep from private farms in different localities in Assiut Govermorate, which 85 sheep were naturally infected with *Babesia*, and 20 sheep were clinically healthy used as control. The clinical signs of diseased sheep revealed a marked hyperthermia, loss of appetite, depression, weakness, cessation of rumination, extreme pale mucous membrane due to severe anemia, increased respiratory rate and labored breathing. The urine was dark red to brown coloration and later on jaundice subsequently developed. The biochemical data revealed that total bilirubin, direct and indirect levels were highly significant increase in infected sheep than healthy one. Total protein was significantly decrease with hypoalbuminaemia, while globulin, glucose and cholesterol were increased. Blood serum calcium and sodium levels showed a significant decreased, while serum level of inorganic phosphorous was increased in infected animals. On other hand no significant difference in blood serum potassium and magnesium levels were observed. Blood serum iron revealed highly significant elevation, while copper and zinc levels showed highly significant decreased. A highly significant increase in AST, ALT and AP were evident.

INTRODUCTION

Diseases of small ruminants are among the least recognized problems in veterinary science, this is true especially for tick-born diseases of sheep (**Friedhoff, 1997**). *Babesia* species are intraerythrocytic protozoan of domestic and wild animals caused anemia and hemoglobinuria. Among the *Babesia* species affecting small ruminants and incriminated for major economic losses, such loss result from deaths of affected sheep, unthriftines of chronic cases and cause the greatest economic losses in sheep production.

Babesia ovis is known to occur in the Mediterranean basin and reported to be the most pathogenic tick-born diseases, sheep babesiasis caused by *Babesia ovis* and *Babesia motasi* in the areas infested with *Rhipcephalus bursa*. Morbidity and mortality due to babesiasis in sheep corresponded closely to the seasonal activity of vector *Rhipicephalus bursa*, the peak was in summer followed by spring. **(Abou EL-Naga, 2000; Omran & Abd EL-Azeim, 2000; Ramadan & Lubna, 2000 and Yasin, 2003)**.

The present work was carried to investigate the effect of naturally infected sheep with Babesia upon observed, the clinical signs and some serum biochemical changes.

MATERIAL AND METHODS

Animals: One hundred and five adult sheep as both sex, 3-5 years old and 35-55 Kg. B.wt from a private farms in different localities in Assiut Governorate, which 85 sheep were naturally infected with *Babesia*, in addition to 20 sheep were clinically healthy used as control. All animals were subjected to careful clinical and laboratory investigation to insure their healthy status according to **Pugh, (2002).**

Samples: **Blood smears**, thin blood smears were collected from the ear vein of all the examined animals and individually prepared. Fixed blood films were stained with Giemsa stain for identification of blood parasite according to **Meyer *et al.*, (1992)**. **Blood samples**, were collected from the jugular vein in dry sterilized centrifuge tubes from each animal and allowed to clot at room temperature, then centrifuged at 3000 r.p.m. for 20 minutes to separate serum. The collected clear sera were kept at –20°c till used for biochemical assay.

Blood serum glucose, cholesterol, total bilirubin, direct bilirubin, total protein, albumin, AST, ALT, AP, calcium, phosphorus and magnesium, were determined spectrophotometrically used standardized test-kits supplied from Bio-Merieux (Bains/France). Blood serum sodium and potassium levels were determined by using flame photometer corning 400.

Blood serum coppor, iron, and zinc levels were determined using Atomic absorption spectrophotometer (Perkin Elmer Model 2380 USA) is Soil and Irrigation Department, Faculty of Agriculture, Assiut University.
Blood serum indirect bilirubin, globulin and albumin/globulin ratio were calculated mathematically.

Statistical analysis: The obtained data was subjected to software program according to **Selvin, (1996)**, to study the effect of babesiasis on some serum biochemical values.

RESULTS

Clinical findings of the diseased sheep were summarized as marked increase of temperature, loss of appetite, depression, weakness and cessation of rumination, extreme pale mucous membrane due, increased respiratory rate, labored breathing, the urine was dark red to brown color and jaundice subsequently developed. All fecal samples of diseased and healthy sheep were free from any parasitic ova. Examination of blood films of diseased sheep revealed infection with *Babesia* species. In addition ticks showed on the skin of infected sheep.

The results of biochemical analysis of blood sera of infected and controlled sheep are illustrated in Tables (1, 2 & 3).

DISCUSSION

Babesia is one of the most important diseases in tropical and subtropical countries. The severity of the disease increases with the long exposure to stress factors, which lower the productive performance of the animals. The difference of severity of the disease may attribute to the higher incidence of tick vectors and the change in husbandry, climatic condition and control of ticks, with respect to the seasonal variation that the peak was in summer followed by spring that agreed with **Yeruham *et al.*, (1998)** and **Ramadan and Lubna, (2000)**. Clinical examination among diseased sheep showed that the affected sheep had marked increased in temperature, loss of appetite, dry muzzle and cessation of rumination, increased respiratory rate, labored breathing, the urine was dark red to brown in color. Similar signs were recorded by **Amer *et al.*, (1987), EL-Sawahly, (1999) and Omran and Abd EL-Azeim, (2000)**.

Serum biochemical changes in sheep infected with *Babesia ovis* has been documented. The results indicated that total bilirubin, direct and indirect were highly significant increase in infected sheep than healthy one, the former results emphasize liver affection. Similar results reported by **Habela *et al.*, (1991), Yeruham *et al.*, (1998) and Abou EL-Naga, (2002)**.

Total protein and albumin were significantly decrease, while globulin was increase. These results may be due to destructive effect of *Babesia* on liver cells producing liver defects and impaired synthesis of total protein and albumin **EL-Sawahly, (1999),** or due to renal insufficiency caused by the nephrotoxic effect when hemoglobin released from the ruptured red blood corpuscles due to parasite multiplication. These results agreed with those reported by **Habela *et al.*, (1991) and Abou EL-Naga, (2002)**. The increase in globulin was attributed to immune response of animal body to the infection **EL-Sawahly, (1999) and Omran and Abd EL-Azeim, (2000)**. Increase in glucose and cholesterol were observed in infected sheep in comparison to

healthy animals these findings indicating liver disease and nephrotoxic syndrome. Similar results were previously obtained by **Abouzina, (1989) and Abou EL-Naga, (2002).**

The effect of *Babesia* on calcium and sodium levels showed a significant decreased, while serum level of inorganic phosphorous was increase in infected animal in comparison to healthy one. The obtained results may be due to renal insufficiency caused by the nephrotoxic effect of hemoglobin coming from the rupture red blood corpuscles due to parasite multiplication, also by liver involvement and anorexia for hypocalcemia as well as the haemolytic nature of anemia. The obtained results coincided with these previously observed by **Habela *et al.*, (1991) and Abou EL-Naga, (2002).** On the other hand no significant difference in serum potassium and magnesium levels were observed. Such conditions agree with **Muley *et al.*, (1980) and Abou EL-Naga, (2002).** Blood serum iron level revealed highly significant elevation, these elevations were similar reported by **EL-Saifi *et al.*,(1990) and Omran and Abd EL-Azeim, (2000).** Who attributed this alteration to the intravascular hemolysis. Blood serum copper and zinc showed highly significant decrease, which may attributed to liver and bone marrow involvement as well as copper depletion **Ceci *et al.*, (1997).**

A highly significant increase in Aspartate aminotransferease (AST), Alanin aminotransferease (ALT) and Alkaline phosphatase (AP) were evident in infected sheep in comparison to control one, such elevation was due to cellular damage caused by babesia organisms lead to intravascular hemolysis which lead to anoxia and inflammatory lesions in various organs especially liver and kidneys causing nephrotoxic effects and lysis of erythrocytes during Babesia infection, these results were supported by the results obtained by **Abou EL-Naga, (2000); Omran and Abd EL-Azeim, (2000) and Radostits *et al.*, (2000),** in similar condition.

Finally it can conclude that *Babesia ovis* caused several pathological effects in many organs and tissues specially liver and kidneys to the animal host, which lead to biochemical, metabolic and electrolytes balance changes in blood serum of the affected animals. So it must be kept in mined while treatment of diseased animals, by eradication of ticks associated with additional treatment containing mineral mixture and injection of electrolytes solutions.

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Table (1): Effect of *Babesia ovis* infection on some blood serum biochemical parameters in sheep.

Parameters		Clinically healthy sheep	Infected sheep with *Babesia*
Total bilirubin	mg/dl	0.37±0.04	1.38±0.20**
Direct bilirubin.	mg/dl	0.11±0.01	0.25±0.05**
Indirect bilirubin	mg/dl	0.26±0.03	1.13±0.15**
Total protein	gm/l	76.50±2.75	66.21±1.29*
Albumin	gm/l	37.30±1.50	24.11±0.80*
Globulin	gm/l	39.20±0.95	42.10±0.49
A/G	%	0.94±0.05	0.57±0.12*
Glucose	mg/dl	69.25±3.75	80.90±3.50
Cholesterol	mg/dl	133.61±5.70	141.80±8.35

The obtained results were mean ± SE.

* Significantly different from healthy at (P<0.05).

** Significantly different from healthy at (P<0.01).

Table (2): Effect of *Babesia ovis* infection on some blood serum biochemical macro-and micro elements in sheep.

Parameters	Units	Clinically healthy sheep	Infected sheep with *Babesia*
Calcium	mg/dl	9.75±0.55	6.85±0.59*
Inorganic phosphorus	mg/dl	6.83±0.88	7.85±0.45*
Magnesium	mg/dl	2.66±0.21	2.80±0.75
Sodium	mmol/L	138.85±2.33	122.20±1.88*
Potassium	mmol/L	6.71±0.12	6.75±0.10
Copper	µg/dl	93.80±6.50	65.21±6.53**
Iron	µg/dl	147.30±9.85	256.80±18.2**
Zinc	µg/dl	97.36±7.89	72.60±6.36**

The obtained results were mean ± SE.

* Significantly different from healthy at (P<0.05).

** Significantly different from healthy at (P<0.01).

Table (3): Effect of *Babesia ovis* infection on some blood serum enzymes in sheep.

Parameters	Units	Clinically healthy sheep	Infected sheep with *Babesia*
AST	I.U/L	62.50±3.75	153.90±7.88**
ALT	I.U/L	14.22±1.78	35.85±3.75**
AP	I.U/L	125.81±9.30	151.90±7.37**

The obtained results were mean ± SE.

* Significantly different from healthy at (P<0.05).

** Significantly different from healthy at (P<0.01).

الملخص العربى

دراسات إكلينيكية و بيوكيميائية في مصل دم الأغنام المصابة طبيعيا بالبابيزيا بمحافظة أسيوط

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يعد مرض حمي البول الدموي (البابيزيا) عند الأغنام أحد الأمراض الناجمة عن الإصابة بالأوليات, ويسبب هذا المرض طفيليات بذرية وحيدة الخلية صغيرة الحجم تنتمي إلى جنس البابيزيا. أجريت الدراسة علي ٨٥ من الغنم المصاب طبيعيا بالبابيزيا. بالاضافة إلى ٢٠ غنمه سليمة استعملت كضابط للتجربة. يتميز أعراض هذا المرض بارتفاع شديد بدرجة الحرارة مع فقدان للشهية وتوقف الاجترار وهزال وضعف مع هبوط عام وصفير الأسنان ويزداد التنفس وعدد دقات القلب والأغشية المخاطية باهتة يرقانية اللون والبول غالبا ما يكون لونه احمر داكن. أظهرت نتائج التحاليل البيوكيميائية لمصل دم الأغنام المصابة إلى زيادة معنوية عالية في كل من البيلوروبين الكلي والمباشر والغير مباشر ونقص معنوي في البروتين الكلي والالبيومين بينما زيادة غير معنوية في الجلوبيولين,الجليكوز والكلوستيرول وجود انخفاض معنوي لكل من الكالسيوم والصوديوم مع زيادة في الفسفور العضوي مع عدم اختلاف في مستوي كل من البوتاسيوم والماغنسيوم. أما بالنسبة إلى عنصر الحديد فوجد زيادة معنوية بينما كان مستوي النحاس والزنك منخفض. وجود زيادة معنوية مرتفعة في مستوي كل من إنزيم الاسبرتات أمينو ترانسفيريز والالانين أمينو ترانسفيريز والالكلين فوسفاتيز.

إن إصابة الأغنام بحمي البول الدموي يسبب خسائر اقتصادية كبيرة وهذا يتطلب بذل جهود كبيرة للتحكم ومن ثم التخلص من هذا المرض. لذا ينصح بإجراء مكافحة دوريه للقراد بالمبيدات الحشرية غير الضارة بصحة الحيوان والبيئة لأن القراد يقوم بدور الناقل لمرض حمي البول الدموي.