BABESIOSIS CABALLI IN ONE-HUMPED DROMEDARIES OF BASRAH PROVINCE

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ABSETRACT

Babesiosis caballi infection were detected in one-humped camels in Basrah province. The study were conducted on 38 dromedaries , 3-6 years old of both sexes infected with *Babesia caballi*. reared in AL-zubair district of Basrah , Iraq. Infection with *Babesia caballi* were diagnosed on the basis of Giemsa stained blood smears . Ten clinically healthy camels were served as controls. Results showed that clinically infected camels show signs of loss of appetite , paleness of mucus membranes, emaciation, rough hair coat, lacrimation and diarrhea, on the other hand some diseased camels were suffer from hemoglobinurea, coughing and ticks were detected on different body regions. Statistically significant increase were encountered in body temperature, respiratory and heart rates in diseased camels compared to controls. *Babesia caballi* trophozoites found oval or elliptical with pear-shaped merozoites occurring mostly in pairs inside the erythrocytes and parasiteamia ranged between (5-8%), Moreover there was significant reduction in the mean values of TRBc, Hb, PCV, However macrocytic normochromic type of anemia were indicated. Results also indicated significant increase in total leukocytes count and lymphocytes. Data concerning the indices of clotting factors of normal controls and *Babesia caballi* infected camels indicated significant decrease in total platelets count ,However mean platelets volume ,platelets distribution width, clotting time, Prothrombin time and activated partial thromboplastin time were significantly increased in diseased camels compared to controls ,Furthermore Fibrinogen were decreased in diseased camels. It have been concluded that *Babeesia caballi* could infect camels causes economic loss, therefore all suspected animals reared in AL zuber district should be screened.

INTRODUCTION

Camels is an important multi purpose animals in arid and semi-arid areas of the world, could be infected with different infectious diseases, since knowledge of diseases that affected camels and how to treated and prevented them as well as general health monitoring remains limited in camels world (1,2).

Camels babesiosis were an acute, or chronic infectious disease, distributed over most of the world specially in camel grazing areas (3).The disease were responsible for deteriorates effects, high morbidity rate and high remarkable and economic losses, caused by the tick-borne hemo-parasitic protozoan (4).

In dromedaries specially one humped camels the disease mostly caused by *Babesia caballi* and *Babesia equi*,(5), since susceptibility of the disease does not appear to altered with age, sex and animal species (6). The disease were also call piroplasmosis and endemic in most tropical and subtropical parts of the world, this

infection has been documented in cattle , horses, sheep, goats and might also transmitted to human beings , However , its occurrence were always related to the distribution and activities of ticks in the genus *Hyalomma ,Rhipicephalus*, and *Dermacentor* ,Nevertheless, The lifecycles of *B. caballi* and *B. equi* are similar and include developmental stages in both the equine host and the vector tick, The life cycles of both parasites include an asexual infective stage (Sporozoites), an asexual blood stage (Merozoites), and sexual blood stage (Gametocytes) (7).

In general Babesiosis were manifested by Fever, in appetence, progressive anemia, hemoglobinemia and hemoglobinurea, pale and / or icteric mucous membranes , digestive disturbances, emaciation and some time sudden death (8).

Studies of *Babesia caballi* infected camels in Basrah province were very scarce and little information's had been provided ,Therefore the present work were designed to diagnosed camels babesiosis with evaluation of clinical ,hematological pictures and clotting factor indices.

MATERIALS AND METHODS

Animals and clinical examinations : The study was conducted on 38 camels, 3-6 years old of both sexes infected with *Babesia caballi*. reared in AL-zubair district of Basrah , Iraq. Infection with *Babesia caballi* were diagnosed on the basis of Giemsa stained blood smears ,Furthermore animals were seen infested with ticks distributed on different parts of animal body. Ten clinically normal and healthy camels were served as controls. Routine clinical examination had been carried out in diseased and control animals , Moreover complete history was obtained upon presentation in the clinic and emphasis were concentrated on clinical signs observed, However body temperature, respiratory and heart rate were calculated.

Sampling and Hematology : Blood were drained from each camel by jugular vein puncture. Blood mixed with EDTA (2.5 mL) were used to determine total erythrocyte count (TRBc), packed cell volume (PCV) haemoglobin concentration (Hb), Total leukocyte counts (TLC), platelets count (Plt), mean platelets volume (MPV), platelets distribution width. (PDW),in addition Mean corpuscular volume (MCV),Mean corpuscular hemoglobin concentration (MCHC)were also calculated .(Hematology analyzer, Genex, USA).

Giemsa-stained blood smears were used for differential leukocyte counts (9).Another (2.5) milliliter of blood mixed with Trisodium citrate were used to determine prothrombine time (Prt), activated partial thromboplastine time (Aptt) and Fibrinogen using commercial kits (Biolabo, France). Clotting time (CT) were also estimated according to (10).Moreover Thin and thick blood smears stained with Giemsa examined under light microscope were used to identified the parasite (11).

Statistical analysis: The significance of variations between *Babesia caballi* infected camels and healthy animals were statistically analyzed using (SPSS) T-test, (12).

RESULTS

Clinically infected camels showed sings of loss of appetite , paleness of mucus membranes, emaciation, , rough hair coat, lacrimation with serous ocular discharging, diarrhea with passing of watery fecal materials. on the other hand some diseased camels were suffer from hemoglobinurea with passing of dark coffee-like urine , coughing and ticks were detected on different regions of the body (Table 1).

Table 1: Clinical signs of camels infected with *Babesia caballi*

Clinical signs	Diseased camels	%
Loss of appetite	35	92
Pale mucus membranes	31	81.5
Emaciation	31	81.5
Rough hair coat	22	57.9
Lacrimation	18	47.36
Diarrhea	15	39.47
Hemoglobinurea	11	28.94
coughing	8	21
Presence of ticks on different body regions	33	86.84

Statistically significant increase ($p<0.05$) were encountered in body temperature, respiratory and heart rates in diseased camels compared to controls , (Table 2).

Table 2: Body temperature, respiratory and heart rate of camels infected with *Babesia .caballi* and controls.

Parameters	Controls	Diseased camels
Body temperature C °	38.3 ± 0.54	39.7 ± 1.3 **
Respiratory rate/mint	9.3 ± 2.71	19.6 ± 5.82**
Heart rate/mint	31.2 ± 3.6	57.4 ± 5.3 **

Values are mean and standard error of mean ,Significance ** ($P<0.05$)

Babesia caballi trophozoites looked elliptical or oval in shape ,However the merozoites were pear-shaped occurring mostly in pairs inside the erythrocytes and parasiteamia ranged between (5-8%) Fig.1

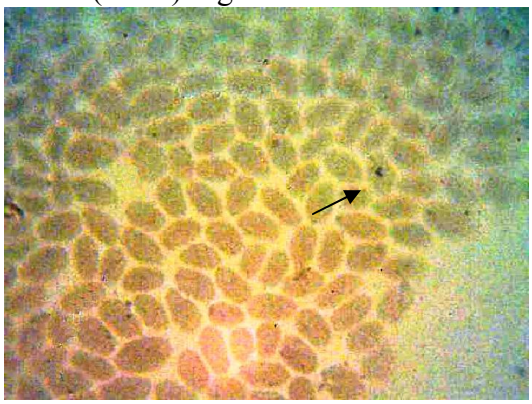

***Fig:1 Babesia caballi* inside camel erythrocyte**

There was significant reduction ($p<0.05$) in the mean values of total erythrocytes count ,hemoglobin concentration and packed cell volume in infected camels and significant increase ($p<0.05$) in mean corpuscular volume reflected macrocytic normochromic type of anemia . Results also indicated significant increase ($p<0.05$) in total leukocytes count and lymphocytes (Table 3, 4).

Table 3:Blood parameters of camels infected with *B.caballi* and controls.

Parameters	Controls	Diseased camels
RBC $\times 10^6$	7.84 ± 1.26	4.85 ± 1.72 **
Hb g/dl	12.6 ± 2.33	8.45 ± 1.26 **
PCV %	29.5 ± 4.68	23.3 ± 3.76**
MCV /fl	37.67 ± 4.54	48.6 ± 3.2 6 **
MCHC/dl	42.5 ± 7.61	42.53 ± 6.11

Values are mean and standard error of mean ,** (P<0.05)

Table 4:Total and differential leukocytes count of camels infected with *B.caballi* and controls.

Parameters	Controls	Diseased camels
WBC $\times 10^3$	11.34 ± 1.64	13.41 ± 1.62 **
Lymphocytes %	45.3 ± 2.3	50.2 ± 2.16 *
Neutrophils %	49.2 ± 1.23	44.2 ± 2.15 *
Monocytes %	3.5 ± 0.7	3.6 ± 0.49
Eosinophils %	2.13 ± 0.9	2.2 ± 0.61
Basophils %	0.7 ± 0.13	0.7 ± 0.12

Values are mean and standard error of mean ,** (P<0.05)

Data concerning the indices of clotting factors of normal controls and *Babesia caballi* infected camels were presented in Table(5).There were significant decrease (P<0.05) in total platelets count ,However mean platelets volume ,platelets distribution width, clotting time, Prothrombin time and activated partial thromboplastin time were significantly increased in diseased camels compared to controls ,Moreover Fibrinogen were significantly (P<0.05) decreased in diseased camels compared with controls.

Table 5: Clotting factors indices of infected camels with *Babesia caballi* and controls

Parameters	Controls	Diseased camels
Plt $\times 10^3$	452 ± 20.44	353 ± 18.82**
MPV /fl	4.32 ± 0.81	7.12 ± 0.53**
PDW %	13.27 ± 1.7	17.62 ± 1.8**
CT / mint	3.4 ± 1.55	4.3 ± 1.25**
Prt / sec	112 ± 4.7	133 ± 3.6**
Aptt /sec	12.36 ± 1.6	15.44 ± 1.28**
Fibrinogen mg/dl	310 ± 6.22	256 ±9.14**

Values are mean and standard error of mean ,** (P<0.05)

DISCUSSION

The one humped camel, Camelus dromedarius, is physiologically and anatomically adapted to survive harsh conditions, Thereby it is a widely distributed domestic animal in arid and semi-arid regions of Arabic lands Africa, and Western Asia and up to India, Moreover, The highest numbers have been reported from Somalia and Sudan(13) Furthermore, tick infestations and the resulting transmission of serious pathogens in ruminants is one of the most important problems of the livestock industry in developing countries (14). Concerning camel disease, camels

were previously considered resistant to most of the diseases affecting animals, but as much research was investigated , camels were found to be susceptible to a large number of pathogenic agents (15).The clinical signs observed in infected camels with *Babesia caballi* were in sported data described by (16,17) as paleness of mucus membranes were reflected the development of anemia and decrease hemoglobin concentration and total erythrocytes count, was due to erythrocytes lysis and removal of infected red cells by the reticuloendothelial system (18). Diarrhea which were detected in infected camels may occur due to digestive disturbances (15) presence of ticks which were infested most of body parts of infected camels indicated that it's the important transmitters of *Babesia caballi* (7). Increase body temperature may indicated increase level of librated pyrogens due to lysis of body cells followed by stimulation of thermoregulatory centers for fever crises (13).

Respecting to hemogram there was a significant decrease in total erythrocytes count ,hemoglobin concentration and packed cell volume reflecting macrocytic normochromic type of anemia, similar results were recorded by (3). It have been thought that the cause of anemia concerning *Babesia caballi* infection may be of different pictures, the direct parasitic effect to the infected erythrocytes may be probable or decrease life span of RBCs and also depression of hemo-poitic system (5),Moreover anemia in infected camels with blood parasites is due to extensive phagocytosis of infected erythrocytes initiated by parasitic damage to erythrocytes and the antierythrocytic auto antibodies changes in bone marrow are an indication to bone marrow depression (3).Furthermore The type of anemia in the present study (macrocytic hypochromic) indicated regenerative form of anemia and the number of reticulocytes will increase in blood stream, same results were stated by (4)

Examination of stained blood films under light microscope in the present work revealed that *Babesia caballi* are large size parasite, However the trophozoites are oval or elliptical with pear-shaped merozoites occurring mostly in pairs inside the erythrocytes and parasiteamia were ranged between (5-8%), these results were similar to those seen by (3,7). Significant increase in leukocyte count with lymphoctosis were in agreement with that reported by (5),Since leukocytosis is the causal to stimulated lymphoid tissues and stem cells in the bone marrow by the parasite and its toxins, Nevertheless leukocytosis might occur as a result to lymphoid depletion and disorganization with massive lymphocytes, Moreover lymphocytosis in Babesia infection was marked during the formation of antibodies in response to antigen (9,19).

Babesiosis caballi infection in camels very often induces changes in the coagulation system causing the development of disseminated intravascular clotting (20), It is encouraged by blood concentration and an increase in presentation of coagulation activators with a simultaneous decrease in coagulation inhibitors activity (21).The most common coagulopathy in animals with blood parasitic infection is a hypercoagulable state associated with disseminated intravascular coagulation and the intensity of this coagulopathy depends on the severity and duration of the disease , (22).In the present study data concerning the indices of clotting factors of normal controls and *Babesia caballi* infected camels show significant decrease in total platelets count ,increase platelets volume ,platelets distribution width, clotting time, Prothrombin time and activated partial thromboplastin time in diseased camels ,Moreover Fibrinogen were significantly decreased ,these results were also mentioned by(20,23). It have been mentioned that any bleeding tendency were occur in the body must followed by the process of clotting, and there were several factors play an important role in this process such as vascular factors, More over the numbers of

blood platelets and their activities had been significant role in the process of coagulation, in which the aggregates of blood platelets and then its adherence within the vessel wall causing Platelets thrombus or temporary plug ,(24). Decrease in platelets number may also occur due to depression of bone marrow activity, and platelets wasting (25) . Furthermore the clotting phase (Coagulation) considered as the final stages of the clotting mechanism which are activated by specific factors as such, Hagman factor, Plasma thromboplastin antecedent factor and thromboplastin component, which is responsible for transform prothrombin to thrombin and the fibrinogen to fibrin, resulting in deposition of Fibrin clot within the blood vessels (26), This will disturb the hemostatic mechanism enhanced by Disseminating intra-vascular coaggulopthy, causing micro thrombosis and infarction of special organs (27,28)It has been reported that prolonged prothrombin time and activated partial thromboplastin time was the most frequently observed abnormality in the coagulation profile and was more likely to be prolonged in animals suffering from babesiosis that might not survive (20,29)

Changes of clotting factor indices concerning babesisosis which were indicated in the present work was also mentioned by (30,31)in horses ,cattle ,sheep and goats .

في محافظة البصرة*Babesia caballi*خمج الجمال أًحادية السنام بالنوع

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الخلاصة

كشف الخمج بالنوع ***Babesia caballi*** في الجمال ذوات السنام الواحد في محافظة البصرة ، إذ أجريت الدراسة على ٣٨ جمل بأعمار تراوحت بين ٣-٦ سنوات ومن كلا الجنسين كانت خمجة بالنوع ***Babesia caballi*** كانت ترعى في مناطق الزبير من محافظة البصرة –العراق .تم تأكيد التشخيص بالفحص ألمختبري لعينات الدم المصبوغة بصبغة الكمزا كما تم فحص عشرة جمال سليمة سريرياً عدو كمجموعة سيطرة.أظهرت الجمال الخمجة علامات سريريه تمثلت بانعدام الشهية ،شحوب الأغشية المخاطية ،الضعف العام، خشونة الشعر ، تدمع العينين والإسهال فضلا عن ملاحظة البيلة الهيموكلوبينية والسعال مع تواجد القراد متطفلا على اجزاء مختلفة من جسم الحيوانات المريضة .أكدت نتائج الدراسة حدوث ارتفاع معنوي في معدلات درجة حرارة الجسم وضربات القلب وترداد التنفس في الجمال الخمجة بالمقارنة مع مجموعة السيطرة، لوحظ الطفيلي داخل كريات الدم الحمر بأشكال مختلفة كالبيضوي والاهليليجي والكمثري المزدوج وتراوحت النسبة المؤية لطفيلية الدم بين(٥-٨%) فضلا عن ذلك فقد لوحظ تناقص معنوي في معدلات العدد الكلي لكريات الدم الحمر ، تركيز خضاب الدم وحجم خلايا الدم المرصوصة وكان فقر الدم من النوع ذي الكريات كبيرة الحجم سوية الصباغ ، كما تزايد معنوياً العدد الكلي لخلايا الدم البيض واللمفوسايت كما لوحظ تناقص معدلات العدد الكلي للصفيحات الدموية بشكل معنوي وارتفاع معدلات حجمها وانتشارها مع زيادة معدلات زمن التجلط وزمن سابق الخثرين وزمن حرك الخثرين الجزئيي، وانخفاض معدلات منشئ الليفين فيالجمال الخمجة بالمقارنة مع حيوانات مجموعة السيطرة .استنتج من هذه الدراسة ان النوع ***Babesia caballi*** يمكن ان يخمج الجمال ذوات السنام الواحد مسبباً خسائر اقتصادية وعلية فأن جميع الجمال في مناطق الزبير يجب فحصها.

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