



# Studies of Naturally Infected Babesiosis and Its Effect on Some Hematological and Biochemical Parameters in Cattle in Qena, Egypt



**Mohamed Saied MM\***

General Organization of Veterinary Service, Egypt

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**\*Corresponding author:** Mohamed Saied MM, PH.D., Veterinarian at GOVS (General Organization of Veterinary Service), Egypt,

Email: mosmvet@yahoo.com

## Abstract

In the present study, 40 Egyptian cattle infected with babesiosis and 10 healthy (as control) were used as animal material. Hematological findings that were observed with domestic animals in connection with blood parasite infections are very essential. In this study it was demonstrated that value of hematological parameters of the group, comprising infected animals, were relatively lower compared to control group parameters. He infected animal showing decrease in RBC's counts, WBC's counts, an increase in phosphorus, decrease in calcium. Serum level of aspartate aminotransferase (AST) showed significant increase in babesiosis, while the Serum level of alanine (ALT) was significantly increased in Ababesiosis. Serum level of iron and copper suffered from babesiosis showed significant increase of both iron and copper serum levels. The aim of this study was to ascertain the effect of babesiosis on hematological parameters and several mineral levels.

**Keywords:** Cattle; Babesiaovis; Hematology; Mineral substances

## Introduction

Babesiosis is a protozoan disease, which is generally characterized with high fever (40-41°C), anorexia, weight loss, ruminal atony, dyspnoea, red water urine (haemoglobinuria) and jaundice, of sheep, goat, cattle, horse, dog, and cats. emaciation, anemia, various degrees of jaundice (icterus) from paleness in mild cases to severe yellow discoloration of conjunctiva and vaginal mucous membranes in more progress cases. The vector places itself in animal's erythrocytes and Babesia forms can vary as pear-shaped, round and elongated.

The most common species that causes infection on cattle are in Egypt. *Babesia bigemina*, *Babesia divergens*, *Babesia bovis* babesia major. Two species, *B. bigemina* and *B. bovis*, have a considerable impact on cattle health and productivity in tropical and subtropical countries [1-8]. The mucous membranes are first hyperaemic, but at the later stages, they become icteric and the color changes to the pallor of anemia. Primary cause of anemia is due to intravascular haemolysis and rate of destruction of erythrocytes and capacity of erythropoiesis are the main denominators of the occurrence and intensity of the anemia [9-12].

In Egypt, bovine babesiosis is caused mainly by *B. bigemina* and *B. bovis* and considered as the most important and endemic parasitic disease affecting cattle [8,13]. Most often owners are trying to describe the clinical appearance of their animals

using less informative symptoms, which often accompanies most diseases. Only few owners are able to describe symptoms, which could be pathognostic initially to babesiosis, and let the veterinarian to apply purposely one or more tests.

## Material and Method

Forty (40) Egyptian cattle infected with babesiosis and ten (10) healthy (as control) were used as animal materials. Blood samples were collected from the jugular vein into EDTA-containing tubes from 50 animals (40 cattle infected and 10 cattle as controls) of both sexes and aged 2-5 years, and were originating from different villages. The animals were examined at the Veterinary unit.

The control group (10 cattle) was carefully examined clinically and parasitological and found healthy and free from external, internal, and hemoparasites. Approximately 10ml of blood was taken from the jugular vein of all animals with a syringe containing EDTA. The blood samples were subjected to hematological parameters analysis [14,15].

## Clinical examination

Animals were subjected to clinical and hematological examinations at Veterinary unit. The field-exposed group showed various degrees of bovine babesiosis such as high fever (>40 °C), anorexia, hemoglobinuria (bloody urine), anemia, and

jaundice. They were also infested with ticks to various degrees. The control group was examined thoroughly for presence of any abnormal clinical changes and external parasites, and was thoroughly examined by different laboratory techniques such as direct smear, flotation, sedimentation and Barmen's techniques and blood film to confirm the absence of any internal parasites.

## Results

### Clinical Findings

Cattle infected with *B. bovis* showed typical clinical signs of babesiosis. Briefly, highly rise in body temperature (40-41.5 °C), conjunctive and vaginal mucous membranes were anemic and the clinical severity was ranged from paleness in mild cases to severe yellow discoloration (icterus) in more progressive cases, red to dark red urine (coffee-color) urine, hemoglobin urea was common sign in cattle with severe clinical manifestation and accelerated heart and respiratory rates. Some cases showed nervous manifestations in advanced stages such as in coordination and head pressing. Various degrees of tick infestations were present around groins, horns, Inter-mandibular space, and ears.

### Hematological Findings

Giemsa-stained blood smears from *B. bovis* infected animals showed intra-erythrocyticpiroplasm of *B. bovis* that were in the form of pyriform or pear-shaped.

The mean values of RBCs, hemoglobin amount, PCV %, WBCs, and differential leucocytes count are listed in. Briefly, the important findings can be summarized as follows; there is a clear significant difference in the hematological parameters between *B. bovis* infected buffaloes and *B. bovis* infected cattle in comparison to control group at P-value ( $\leq 0.01$ ) and ( $\leq 0.001$ ), respectively

## Discussion

Tick-borne diseases have a negative effect on livestock health [16]. In this study, Babesia infection was confirmed via light microscopy examination. Presence of pear shape piroplasm inside RBCs is confirmative of diagnosis especially in acute stages of the disease [17].

### Clinical findings

The observed clinical findings in cattle with babesiosis such as fever, dark brown to coffee urine, pale mucous membranes with empty episcleral blood vessels with reduced appetite could be attributed to severe haemolytic process associated the presence of Babesia sp. inside the red blood cells [18,19] supported this view.

### Hematological findings

Leucogram showed significant decrease ( $P < 0.001$ ) in total leucocytes count and neutrophil. Normocytic normochromic anemia observed in cattle with babesiosis which could be attributed to intravascular haemolysis of red blood cells [20] supported this view. Insignificant changes in total leucocytic

count in total leucocytes count in cattle with babesiosis, while there was significant increase in lymphocytes and monocytes associated with significant decrease ( $P < 0.001$ ) in neutrophils. This could be explained as the breakdown of red blood cells by Babesia sp. [21-24]. Even in animals which recover spontaneously, erythrocyte count, packed cell volume, and hemoglobin level continue to decline steadily after patency. Once the parasites have been eliminated, increased hematopoiesis occurs, evidenced by the presence of nucleated erythrocytes, polychromasia, and anisocytosis [25].

### Biochemical findings

Babesiosis infected cattle showed significant decrease in calcium and increase in phosphorus levels, this agree with [26,27] who noticed the serum changes may include increased potassium and reduced calcium and sodium levels. Babesiosis infected cattle showed significant increase in AST, hypoproteinemia, this may indicate the harmful effect of toxic metabolites of Babesia sp. on liver cells. These results were supported by [28]. Serum level of iron was significantly decreased ( $P < 0.001$ ), while copper showed insignificant change. The drop in serum level of iron may be due to anemia which leads to excessive withdrawal of serum iron to be utilized for erythropoiesis. While others have extremely high concentrations of serum iron [29].

Babesiosis infected cattle showed significant decrease in protein. Our present study indicates that the serum protein and globulin pattern was significantly altered by *Babesia bigemina* infection. There was a significant decrease in total protein in serum of infected clinical cases and these in accordance with data recorded in cattle [30,31], in calves by [32] and In buffaloes [33-35].

Concerning the effect of *Babesia bigemina* infection on activity of liver enzymes, the obtained results revealed a highly significant increase in serum AST and ALT. These results were in agreement with other previous studies reported by Allen & Kuttler [36] Camacho et al [37]. The increase in enzymes activity may attribute to severe anemia that lead to hypoxic and toxic liver damages. Also massive hemolysis may occur which in conjunction with hypoxia may lead to hepatic cell degeneration and glomerular dysfunction leading to increase in AST, ALT and Bun, Allen & Kuttler, [36].

### Control

Babesiosis infected cattle is often only noticed at the onset of hemoglobinuria, when the disease is far advanced. Although therapy and transfusion will generally save an infected animal even at an advanced stage of the disease, it may continue to be severely debilitated for several months after recovery [25,37-39]. Thus, for economic and animal welfare reasons, the best option is to prevent rather than treat infections.

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