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SOME HEMATOLOGICAL AND BIOCHEMICAL BLOOD VALUES IN CATTLE DIAGNOSED CLINICALLY AS EPHEMERAL FEVER IN QENA GOVERNORATE, EGYPT

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ABSTRACT

Forty five cattle were included in this study. They were clinically diagnosed as having bovine ephemeral fever (BEF) infection. Blood samples were collected from infected cattle and controls, 20 healthy cattle were included as a control group. Serum was separated and submitted for the determination of hematological values and biochemical values as Calcium, phosphorus, copper, sodium, chloride, iron, potassium, ALP, ALT, AST, total protein, Creatinine, urea. The evaluated hematological parameters showed BEF-infected animals demonstrated a significant decrease ($P<0.05$) in total Wbcs, Hb. Neutrophils.The evaluated biochemical parameters included to show that BEF-infected animals demonstrated a significant decrease ($P<0.05$) in serum concentrations of TP, CA, P, Fe, Na, K, while ALP and Cu the significantly increased ($P<0.05$) and no variation in the values of Na, Cl, K, ALT, AST, creatinine and urea.

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INTRODUCTION

Ephemeral fever of cattle is caused by the insect-borne rhabdovirus, bovine ephemeral fever (BEF) virus (Van der Westhuizen *et al*. 1967). Bovine ephemeral fever is a non-contiguous epizootic arthropod viral disease infecting cattle and water buffaloes. The clinical severity of the disease is inconsistent with the subsequent rapid recovery of most of the affected animals. The disease is characterized by sudden onset fever, depression, stiffness, lameness, nasal and ocular discharge, and salivation. It has been reported that the clinical signs of ephemeral fever were related to biochemistry, cellular and sociological changes in the blood. There was a rise in peripheral blood neutrophils and fall in lymphocyte counts, a fall in serum calcium levels that directly proportionate with the severity of the clinical picture. The serum magnesium levels were slightly affected, with the marked elevation of plasma fibrinogen on the second day of disease.

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According to (Seller s*et al* (1980) Mediterranean area are in zone "C", in which pathogens are introduced by infected vectors carried on warm winds. A phylogenetic analysis was isolated from Egypt (2005) (Orly Aziz-Boaron *et al*.2012). Ephemeral fever has been known to occur in Egypt for many years (Piot 1896, 1909; Rabagliati 1924). Ephemeral fever has occurred throughout most of Africa to the south of Egypt, where it is endemic with periodic epidemics, (Davies *et al*. 1992), (Saint George T.D. 1985). Single cases are difficult to diagnose, but with a herd outbreak, when cattle at various stages of disease can be examined, diagnosis is made from clinical observations and the history of the outbreak.

MATERIALS AND METHODS

Forty five cattle of both sexes were included in this study. Their ages ranged from 6 months to 5years. These cattle were brought sporadically to a private veterinary clinic in Qena during the spread of EF infection. All were clinically diagnosed as having EFV infection. Blood samples of 20 cattle as controls and 45 cattle were clinically diagnosed as having bovine ephemeral fever (BEF) infection.

Blood was collected from randomly selected clinically healthy and diseased cattle. The cattle were bleeding through the jugular vein and 10 ml of blood was collected from each animal, 4 ml of the blood was collected in plastic tube containing 0.5 ml Ethylene Diamine Tetra acetic Acid (EDTA) for hematological studies and the remaining 6ml of blood samples was deposited in clot activating Tubes for biochemical studies and allowed to clot at room temperature within 3 hours of collection. The samples were stored at –20 °C for analysis by 5010 spectrophotometer (using Egyptian Biochemical diagnostic kits).

STATISTICAL ANALYSIS

Statistical analysis was performed using the SPSS statistical package. All the values were expressed as a mean± Standard Deviation (SD). One way ANOVA was applied to compare various hematological and serum biochemical parameters.

RESULTS

Hematological parameters

The hemogram values were: erythrocytes for Control animals8. 1±1.5%106cm3 and diseased animals9. 18±0.22%106cm3. The hemoglobin for Control animals 9.09±0.22 g/DL and diseased animals 8.9±19.1; leukocytes for Control animals 9.1±1.8%103cm3 and diseased animals5. 7±0.61%103cm3; and Packed cell volume (PCV) % of Control animals 37.08±0.1 and diseased animals35. 82 ± 0.18. Neutrophils (%) 31.04 ± 0.85 for Control animals and diseased animals 41.43 ± 0.84. Lymphocyte (%) 3.93±0.27for control animals and diseased animals4. 06±0.38.

Table 1. Haematological values of Control and diseased animals

Parameter	control animals n=20	diseased animals n=45
Total erythrocyte count (TEC) 10^6/µl	9.18±0.22	8.19±0.41
Hemoglobin (Hb) g/dl	9.09±0.22	8.79±0.41*
Packed cell volume (PCV) %	37.82 ± 0.88	35.08±0.1
Total leukocyte count (TLC) 10^3/µl	9.11±0.61	7.13±0.59*
Neutrophils (%)	31.43 ± 0.84	41.04 ± 0.85*
Lymphocyte (%)	3.93±0.27	4.06±0.38
Monocytes (%)	2.78 ± 0.16	2.05±0.15
Eosinophils (%)	0.30±0.05	0.23±0.07
Basophiles (%)	0.36 ± 0.05	0.20 ± 0.05

Values were expressed as mean ±S.E.
* Means were highly significant at < 0.005

Table 2. biochemical values of Control and diseased animals

Parameter	Control animals n=20	Diseased animals n=45
Calcium mg/dl	9.11 ± 0.2	8.15 ± 0.19*
phosphorus(mEq/l)	3.39± 0.20	2.29 ± 0.21*
copper mEq/l)	10.39± 0.36	13.78 ± 0.37*
sodium(mEq/l)	140.04 ± 0.85	141.43 ± 0.84
chloride(mEq/l)	99.66 ± 0.70	99.59 ± 0.75
iron mEq/l)	140.5±0.15	135.5± 0.16*
potassium(mEq/l)	5.20± 0.22	5.1± 0.26
ALT/IU	9.20 ± 0.05	9.36 ± 0.05
AST/IU	115.5±6.4	116.3±6.5
ALP/IU	120.1±0.2	123.6±0.3*
Total protein g/dl	6.5±1.2	4.7±1.5*
Creatinine (mmo1/l)	100±2.6	101±2.1
UREA mmol/L	7.32±2.22	7.1±2.22

Values were expressed as mean ±S.E.
* Means were highly significant at < 0.005

Monocytes (%) for Control animals2. 05±0.15 and diseased animals2. 78 ± 0.16. Eosinophils (%) for Control animals0. 23±0.07and diseased animals0. 30±0.05. Basophiles (%) for Control animals 0.20 ± 0.05 and diseased animals0. 36 ± 0.05.

Biochemical parameters

The values of biochemical parameters were: total protein for Control animals6. 5±1.2and diseased animals 4.7±1.5,76.4±6.1g/. Aspartate aminotransferase for Control animals115. 5±6.4 and diseased animals116. 9±49.2U/. Alanine aminotransferase (AST) for Control animals 9.20 ± 0.05 and diseased animals9. 3±0.5; total (ALP) alkaline phosphatase 120.1±0.2 for control and123. 6±0.3for diseased animals. Glutamate dehydrogenase Control animals 9.20 ± 0.05 and diseased animals9. 36 ± 0.05. Urea Control animals 7.32±2.22mmol/L; and diseased animal 7.1±2.22 mmol/L.Creatinine for Control animals100±2. 6 and diseased animals101. 0±2.1µmol/L. Total calcium for Control animals9. 11 ± 0.2 and diseased animals8. 15 ± 0.19.2.53±0.25mmol/L; phosphors for Control animals 3.39± 0.20and diseased animals2. 29 ± 0.21mmol/L. Sodium for Control animals140. 04 ± 0.85 and diseased animals141. 43 ± 0.84mmol/L; potassium for Control animals5. 20± 0.22 and diseased animals5. 70± 0.26 , 99.66 ± 0.70mmol/L; chloride for Control animals and diseased animals99. 59 ± 0.75, iron for Control animals138. 50±0.15 and diseased animals140. 50± 0.16. copper for Control animals10. 39± 0.36and diseased animals13. 78 ± 0.37.

DISCUSSION

Bovine ephemeral fever (BEF) is principally a summer disease and has been diagnosed with a wide range of ecological zones, corresponding to the geographical distribution and the peak activity of the arthropod vectors (Yeruham *et al*., 2002) while the present studies occur in November and December 2016 in QENA, EGYPT Bovine ephemeral fever is an acute, insect transmitted viral disease affecting cattle in a many parts of Africa, Asia and the Middle East. Ephemeral means transient or short-lived. The name fits the sudden onset and short course of the disease (Kahrs, 2001). In cattle, the clinical signs were varying among affected animals. Some of them have only a transient fever with few other overt clinical signs such as lameness in one or more legs, in appetence, slight shivering, slight stiffness, excess salivation, nasal and / or al lachrymal discharge with the disappearance of all of these signs within 12-24hours mild form. But the most affected cattle display the most severe form of the disease which characterized by sudden onset of high fever (40.5-41.5oC), depression, complete anorexia, hurried respiration which is usually accompanied by dyspnoea and respiratory reales, rapid pulse, muscle shivering, ruminal stasis, salivation, nasal and lachrymal discharge, stiffness, lameness in one or more legs, enlargement of lymph nodes and subcutaneous edema especially around the joint. They may assume a sitting position or a short period of recumbency after which recovery may be spontaneous. (Burgess, 1971, Kahrs, 2001), (Nadi and Negi, 1999), (Mc Lachlan, 2011)

Hematological parameters

In this investigation, the erythrogram of diseased cattle with BEF showed anemiarepresented by a significant decrease in RBCS, PCV% and Hb content.

The leukogram showed basic and early diagnostic feature of the disease. There was neutrophilia and lymphopenia with the normal leukocyte count. Also, there was a rise in plasma fibronogen and drop in calcium and phosphorus values. All of these parameters were more or less improved three weeks post recovery. These findings coincided with those reported by (Uren *et al*., 1992; Fenner *et al*.,1993, George St. *et al*., 1992, Nandi and Negi,1999; Hassan, 2000, and Attia and Selim, 2000). Such changes could be probably correlated with the viremic stages of the disease.

Biochemical paramters

The obtained data showing a drop in calcium and phosphorus values, this agree with (St. George et AI.1986) (Jameel G.H.*et al*. 2012) and (George St *et al*. 1995) during natural outbreaks of BEF. The copper is increased in diseased animals than controls, these agree with Infection. Bacterial products such as endotoxins, and many inflammatory agents. Increase plasma Cu (Underwood 1977) ,\,Dinarello 1984; and Oppenheim *et al* 1986). (Clark *et al* 1985). The values of iron are decreased in diseased animals (Beisel 1977, (Bullen 1981)while no change of plasma sodium and chloride in diseased and control animals. Plasma of AST and ALT, creatinine and urea have no changes in diseased and control animals, these results do not agree with the results obtained by (Nahed S. Thab*et al*. 2011), while Plasma alkaline phosphatase (AlP) reflects the severity of clinical signs. The clinically significant, though relatively short lived elevations in, ALP levels in severe reactors. (Basson *et al* (1970) found discrete, localized areas of muscle necrosis accompanied by neutrophil infiltration of the sarcoplasm in severe reactors, killed at a late stage of disease.
(Hill and Schultz 1977), There was no change in the normal values of creatinine, urea, AST and alkaline phosphatase. (George *et al*. 1995). Significant decrease in serum TP was observed in animals infected with BEF as a result of hypoglobulinemia which may reflect an inhibition in the number and/or function of lymphocytes (antibody producing cells). Lymphopenia has been reported to be a consistent feature in cattle infected with BEF starting with the onset of fever to return to normal levels after3-4 days (Burgess and Spradbrow 1977; St. George *et al*., 1984; Uren, 1989; St. George *et al*., 1995). In cattle experimentally infected with BEF virus, low levels of neutralizing antibody were detected within the first or second day of clinical disease and lasted for one or two days after of viremia (Young *et al*., 1990).A wide range of inflammatory conditions is known to evoke marked changes in circulating levels of zinc (Zn), copper (Cu) and iron (Fe) in mammals (Underwood 1977; Beisel 1977). Since cattle affected with BEF frequently exhibit neutrophilia and elevated fibrinogen levels, both consistent with an inflammatory event, we made detailed observations on the changes occurring in circulatingCu and Fe.

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