HAEMATO-BIOCHEMICAL CHANGES AND THERAPEUTIC MANAGEMENT OF BABESIOSIS IN CATTLE

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Babesiosis is a tick-borne, intraerythrocytic protozoan parasitic infection that causes significant morbidity and mortality in wide range of domestic and wild animals (Gray and Murphy, 1985). It is the most important disease of cattle worldwide and transmitted by blood-sucking ticks of the Ixodidae family (hard ticks). The most prevalent species, *Babesia bovis* and *Babesia bigemina*, are found throughout most tropical and subtropical regions. Due to universal distribution of the ixodid tick, babesiosis is considered as the second most widespread blood-borne disease of animals (Homer *et al*., 2000) and is prominently gaining increasing interest as an emerging zoonosis of humans (Homer *et al*., 2000 and Zintl*et al*., 2003). The economic losses from these two organisms can be considerable, particularly in developing countries.

Five cross bred cows aged between 4-6 years were presented to the Government Veterinary Hospital Cheruthuruthy with the history of fever, anorexia, passing coffee coloured urine, reduced milk yield, depression and reluctance to move. On clinical examination elevated temperature ranging from 103°F to 104.2°F, accelerated heart rate and respiration, dyspnoea, suspended rumination, presence of icteric mucus membranes (Figure 1) with mild to moderate tick infestation and definite, enlarged lymphnodes with haemoglobinuria were observed.

Blood and serum samples were collected for laboratory investigation. Blood smear examination revealed presence of ***Babesia bigemina***as pear-shaped bodies joined at an acute angle within the mature erythrocyte in 40% of RBCs of all the smears (Figure 2).Haemogram revealed extremely low levels of Hb, PCV, TEC and platelet counts. Serum biochemistry revealed severe hyperglycemia, hyperbilirubinemia, moderate elevation of BUN and AST, and hypoproteinemia. The values are presented in Table 1. Urine was coffee coloured and positive for haemoglobin, glucose and bile pigments in all the five cows.

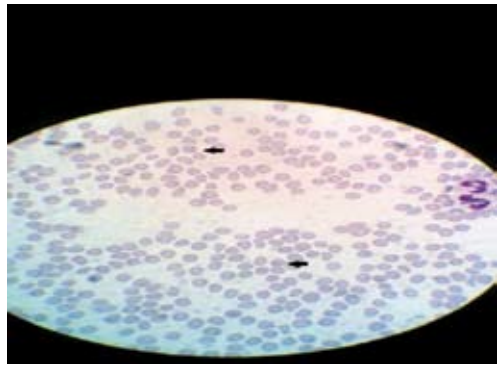

Figure 1: Icteric conjunctival mucous membranes

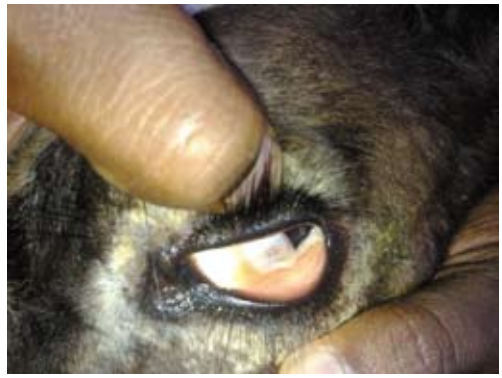

Figure 2: Microscopic view of blood smear with Babesia organisms

The animals were treated with a single dose of Diminazine accurate (Inj. Berenil RTU, Hoechst®) 2.5 mg/kg Bwt i/m at two different sites in neck muscles, long acting oxytetracycline (Inj. Intamycin-LA, Intas Pharmaceuticals) @ 20 mg / kg body wt i/m at 48 hours intervals on two occasions, haematinic (Inj. Feritas, Intas Pharmaceuticals®) 10 ml i/m thrice weekly for one week, rumenotoric (liquid Brotone, Virbac® Animal Health) 40 ml daily orally for 10 days and Injection Rintose (Wockhardt®) 500 ml i/v daily for 3 days. After three days temperature got reduced to 102^0F in three animals. Hemoglobin and PCV levels improved after three weeks. Treatment was successful with diminazene aceturate at 2.5 mg/kg body weight, together with supportive therapy in four cows. Whereas, one cow that was presented at delayed stage died due to severe anemia and delay in initiation of therapy.

The minimum infective dose required to produce overt disease is thought to be 10^3 parasites inoculated intravenously. Variations in the number of parasites injected result in highly significant changes to the prepatent period, peak parasitemia, and the hematological response in addition to the number of infected ticks that feed on an animal, the immune status of the host and the virulence of the infecting strain. Subclinical infections are quite common and are usually missed by the farmer and clinician. Affected animals have low parasitemia, may suffer mild fever and anorexia, and make an uneventful recovery (Zintl *et al*., 2003). Hemoglobinuria, frequently the clinical sign first detected by the owner, occurs at the peak of the hemolytic crisis. Immediately after the hemolytic crisis, a brief lymphocytosis and monocytosis combine to cause a leukocytosis (Gray and Murphy, 1985).

When tick population is very high, the disease may be so acute as to cause death

Table 1: Average Hemato-biochemical values and urine analysis of cows affected with Babesiosis

Parameters	Reference values	Avg Pre-treatment values	Avg Post- treatment values
Hemoglobin (g/dL)	8 – 15	4.5± 0.51	9.3 ± 1.1
PCV (%)	24 - 46	15 ± 2.2	28 ± 1.5
TEC X 10^6/µL	5 – 10	2.3 ± 0.8	5.2 ± 1.2
TLC X 10^3/µL	4 – 12	3.25 ± 0.37	8.3 ± 0.9
MCV (fL)	40 - 60	35.23 ± 0.49	43.7 ± 0.89
MCH (pg)	11 - 17	11.54 ± 0.22	15.2 ± 0.43
MCHC (g/dL)	30 - 36	23.21 ± 1.4	31.1 ± 0.76
Platelets / µL	100000 - 800000	47000 ± 2000	72000 ± 3500
Neutrophils (%)	20 - 45	40 ± 3	46 ± 3
Lymphocytes (%)	45 - 75	51 ± 2	48 ± 3
Monocytes (%)	2 – 7	2 ± 0.57	3 ± 0.65
Eosinophils (%)	2 – 8	7 ± 1	3 ± 2
Basophils (%)	0 – 1	-	-
Serum Biochemical Values			
AST (U/L)	78 - 132	167 ± 8	124 ± 5
TP (g/dl)	5.7 – 8.1	5.8 ± 0.49	6.1 ± 0.7
BUN (mg/dl)	6 – 27	32 ± 1	24 ± 3
Tot. Bilirubin (mg/dl)	0.01 - 0.5	0.9 ± 0.17	0.36 ± 0.9
Glucose (mg/dl)	45 - 75	90 ± 10	65 ± 8
Creatinine (mg/dl)	1 – 2	0.9 ± 0.4	0.83 ± 0.4
Urine analysis			
Blood / Hb	-	+++	-
Glucose	-	±	-
Bile pigments	-	++	±

within a few days, during which the PCV falls below 20% and the parasitaemia, which is usually detectable once the clinical signs appear and may involve 0.2% to 45% of the red cells, depending on the species of babesia (Urquhart *et al.*, 2003). Most of the clinico-haemotological findings observed in the present cases were similar to those reported by Tufani *et al.* (2015). For years, babesiosis treatment has been based on the use of very few drugs like imidocarb or diminazene aceturate. Recently, several pharmacological compounds were developed and evaluated, offering new options to control the disease (Mosqueda *et al*., 2012). Diminazene aceturate consists of an organic base and organic acid but once dissolved in water, it dissociates. It is usually given by intra-muscular injection at doses of 3-5 mg/ kg (Kuttler, 1981). Long acting oxytetracyclinehas been shown to have a prophylactic effect against *Babesia divergens* infection (Urquhart *et al*., 1996). In humans treatment with quinine and clindamycin successfully eradicated the organisms. Subsequent studies in animals have supported the usefulness of this combination of antimicrobial agents (Radostits *et al.,* 2000). Prolonged convalescent period results in considerable loss of production in cattle with babesiosis (Urquhart *et al*., 1996). Oral haematenics and B-complex were continued for three weeks until the animals were completely recovered from anemia.

Summary

Clinical, haematological, biochemical and therapeutic management of babesiosis in cattle were described.

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