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## Studies on the sub-clinical status and its varying hemato-biochemical changes in equine piroplasmiasis

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### Abstract

Three male and 2 female horses were presented to the veterinary clinical complex, Apollo College of Veterinary Medicine, Jaipur with the clinical conditions of temperature (99°F) lethargy, poor performance, conjunctivitis, labored breathing, abdominal respiration, audible lung sounds, increased heart sounds, pulse rate, respiratory rate, and exercise intolerance. Blood smear examination indicated the presence of *Babesia equi*. The hemato-biochemical parameters collectively showed decreased levels of hemoglobin, hematocrit values, total erythrocyte count, MCV, MCH, MCHC and the biochemical changes observed were low albumin, high globulin and an elevated bilirubin (direct), ALT and alkaline phosphatase. The study revealed the hemato-biochemical values of equines under sub-clinical form of *Babesia equi*.

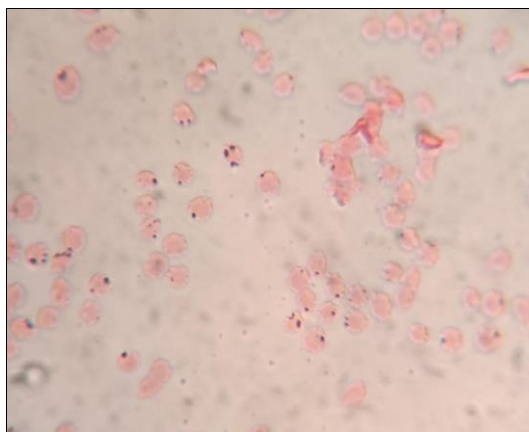
**Keywords:** Hemato-biochemical- sub-clinical equine-piroplasmiasis

### Introduction

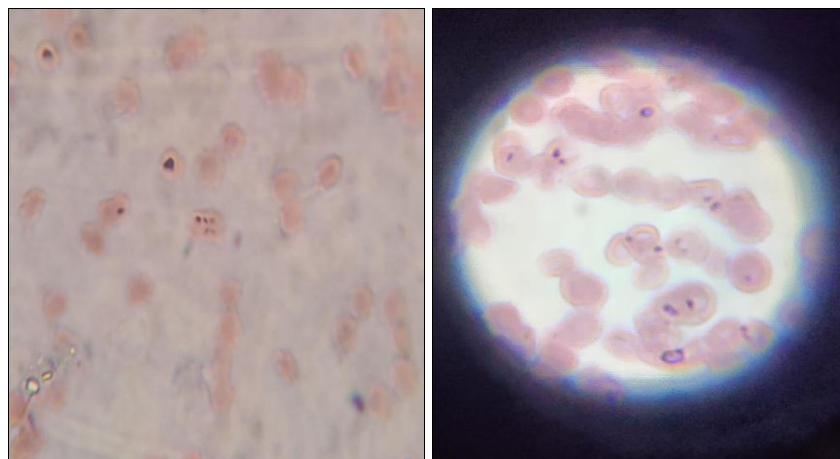
Babesiosis also referred also as Equine piroplasmiasis (E.P.), is a disease of all equids. It is caused by the blood-borne intra-erythrocytic protozoan parasites *Babesia equi* or *Babesia caballi*. (Mehlhorn and Schein: 1998) [13]. These parasites are naturally transmitted from host to host via tick vectors, and dual infection with both organisms has been reported in equids.

The geographic distributions of *B. caballi* and *B. equi* are generally similar and include most of the world's tropical and subtropical regions (Bruning 1996) [3]. Both species of *Babesia* are endemic to many parts of Africa, Europe, the Middle East, and Asia. (Bruning, 1996) [3]. Sanjay kumar (2011) [18] reported that 90% of the world's horse population inhabited by *Theileria equi* infection. The disease is reported from many parts of India (Sanjeev *et al.* 2020) [17]. *T. equi* infection is widely prevalent in different parts of India, including Gujarat, Haryana, Himachal Pradesh, Jammu Kashmir, Punjab, Rajasthan, Utrakhnad, Utter Pradesh, Madhya Pradesh, Maharashtra and Chandigarh (Kumar *et al.*, 2012) [10]. Singla and Deepak Sumbria (2019) [20] reported a prevalence rate of 3.99% of *T. equi* in Punjab state in India. Bharai *et al.* (2020) [4] reported a prevalence of 63.1% Equine piroplasmiasis (E.P) in around Junagadh in Gujarat state by blood smear examination. Singla and Deepak Sumbria (2019) [20] reported a prevalence rate of 3.99% of *T. equi* in Punjab state in India by blood smear examination. Ganesan (2023) [8] reported the prevalence of *Babesia equi* in through bred equines in Rajasthan state, India.

Vial and Gorenflot (2006) [23] reported that the merozoites invade R.B.C. and occur either as two or four in a Maltese cross formation and are seen as pyriform parasites. The trophozoites of *B. equi* appear as round, spindle or elliptical –shaped basophilic structure in Romanowsky stained blood smears examination (Sumbria *et al.* 2014) [21]. *B. equi* found in a single erythrocyte; mainly in pairs forming an acuteangle (Edwards's *et al.* 2005) [6]. Phipps and Phipps (1996) [15] reported jaundice and pulmonary edema as prominent clinical signs in *B. caballi* than *T. equi* infections, whereas general lymphadenopathy has been observed in the *T. equi*.



**Fig 1:** Peripheral blood smears stained by Giemsa- *Babesia equi*



**Fig 2:** Peripheral blood smears stained by Giemsa- *Babesia equi*

**Table 1:** Hemato-biochemical studies

Parameters	Equine-1	Equine-2	Equine-3	Equin-4	Equine-5	Normal ranges.
Haemoglobin(g/dl)	11.80	11.30	10.70	13.60	8.0	10.1-16.1
RBC count (10 <sup>x6</sup> /cu.mm)	4.24	6.78	6.32	7.54	7.23	6.0-10.4
MCV (fl)	47.20	48.10	48.00	50.80	57.5	37.0-49.0
MCH (pg)	16.30	16.70	16.0	18	12.3	13.7-18.2
MCHC (g/dl)	34.60	34.70	35.00	35.50	30.1	35.3-39.3
Platelets (10 <sup>x3</sup> /cu.mm)	173.00	136.00	154.00	138.0	210	117-256
TLC (thou/mm <sup>3</sup> )	7.90	60.0	9.40	9.60	12, 800	5.6-12.1
Neutrophils (%)	64.00	6.06	56.0	59	60.0	52-57
Lymphocytes (%)	30.00	34.0	39.0	37	30.0	21.0-42.0
Monocytes (%)	5	4	4	2	04	3-6.0
Eosinophil (%)	1	2	1	2	06	2-7.0
Basophils (%)	0	0	0	0	0.0	0-2.0
Total protein (g/dl)	6.19	6.68	4.89	5.72	6.36	5.6-7.6
Albumin (g/dl)	3.49	2.57	2.62	2.81	2.71	2.6-4.1
Globulin (g/dl)	2.70	4.11	3.57	2.91	3.01	2.6-4.0
A/G ratio	1.29	0.63	0.73	0.97	0.70	-
AST (U/L)	272.90	204.90	202.00	241.0	165.14	160-412
ALT (U/L)	8.60	5.50	5.00	6.60	32.15	2.7-21
Alkaline phosphatase (U/L)	125.90	125.40	153.30	168.40	190.22	70-227
Bilirubin (direct) (mg/dl)	0.56	0.18	0.33	0.32	0.40	0-0.4
Bilirubin (indirect)	0.73	1.07	4.56	1.33	1.49	---
Bilirubin total (mg/dl)	1.29	1.25	4.89	1.65	1.89	0-6.2
Blood urea (mg/l)	26.70	29.0	45.30	35.30		23.5-57.7
BUN (mg/dl)	12.40	13.50	21.10	16.40	16.10	11-27
Creatinine (mg/dl)	1.32	1.13	1.17	1.23	1.38	0.4-2.2
Calcium (g/dl)	13.40	12.90	13.10	12.80	-	10.2-13.4
Phosphorus (mg/d)	4.13	3.25	2.81	3.50	3.12	1.5-4.7
Sodium (mEq/l)	137.10	133.90	132.90	135.20	138.0	128-142
Potassium (mEq/l)	3.30	3.10	3.50	3.60	3.91	2.9-4.6
Chloride (mEq/l)	103.00	105.00	105.00	101.00	105.0	98-109
Glucose (mg/ml).	113.80	94.60	83.40	90.30	92.0	63-134

## Discussion

### Clinical history and observations

Rothschild & Knowles (2007) [16] reported that equids with sub-acute piroplasmiasis may display anorexia, lethargy, elevated or normal rectal temperature, weight loss, anemia, limb edema, poor performance, increased pulse, respiratory & heart rate. Hailat *et al* (1997) [9] reported varying degree of anorexia, elevated or normal temperature, weight loss, increased pulse and respiratory rates, pale mucus membrane, exercise intolerance, colic, constipation, followed by diarrhea. In this clinical study, the examination of the horses revealed the above clinical signs except colic, constipation and diarrhea.

### Blood smear examination

Peripheral Blood smear from these horses revealed *Babesia equi* as per their morphological studies (Photos). The blood smear examination carried out in these clinical cases also revealed the presence of *Babesia equi* and the merozoite stage appearing as two or four (Maltese cross) as pyriform parasites as studied by Vial and Gorenflot (2006) [23].

### Hematological studies

The haemoglobin content was 8.0 g/dl in an equine. The R.B.C count ranged between 4.24 to 7.23  $10^6$ /cu.mm in all the 5 horses. Laus F *et al.* 2015; Osman *et al.* (2017) [11, 14] reported that in most studies following natural infection, hemoglobin and red blood cells count were found to decrease in infected horses. Erythrocytic parameters such as MVC, MCH, and MCHC were variable with notifiable increases. Out of 5 equines tested in one equine the elevated MCV values were 50.80 fl. In another equine elevated MCHC value was 34.60g/dl. In two horses the MCHC values were at decreased levels. i.e 34.60 & 34.70g/dl respectively. The hematocrit values were low i.e 24.3% in a horse. Mahoney *et al* (1977) [12] reported that most of the equids regardless of the clinical form of infection exhibit some degree of anemia which was the result of hemolysis of the infected RBCs. In this study all the 5 equines showed decreased level of RBC count and hypochromic anemia which were in concurrence with the observation of the present study.

Zobba *et al* (2008) [24] reported that the parasite causes anemia, low level of PCV, thrombocytopenia, varying albumin concentration, hyperbilirubinemia, elevated alkaline phosphatase, SGPT, & SGOT. Allen *et al* (1975) [1] reported thrombocytopenia as uncertain. Wise *et al* (2013) [24] opined thrombocytopenia because of immune mediated destruction or due to splenic sequestration. In this study the thrombocytes were maintained in normal levels in all 5 horses examined.

**Biochemical studies:** The biochemical parameter studies revealed an ALT level of 32.15 u/l in one equine. In another one, the albumin level was observed at low level i.e 2.57g/dl and the globulin level was high i.e 4.11. In this study one horse showed high level of the bilirubin (direct) i.e 0.56mg/dl. Camacho *et al* (2005) [5] reported increased levels of total serum bilirubin, urea, AST, ALT, creatinine, in horses infected with *T. equi.*, Zobba *et al* (2008) [24] reported elevated liver enzymes due to reduced flow of blood to the liver and further opined that the chronicity of the disease, hydration status and associated conditions, can vary the albumin concentration. Frerichs and Holbrook (1974) [7] reported that hypophosphatemia and hypoferrremia are common due to altered RBC metabolisms which were not observed in this

study. Hailat *et al* (1997) [9] reported biochemical changes were mostly associated with fluctuations with wide range of factors such as nutrition, weather, and hydration status, presence of other infectious and non-infectious diseases and the general health status of the animals.

### Conclusion

The study revealed the subclinical status of *Babesia equi* in equine population in Jaipur, Rajasthan state, India with its varying clinical manifestations and associated hemato-biochemical changes. The hemato-biochemical parameters collectively showed decreased levels of hemoglobin, hematocrit values, total erythrocyte count, MCV, MCH, and MCHC and low albumin, high globulin and an elevated bilirubin (direct), ALT, & alkaline phosphatase. The study indicated the prevalence of sub clinical form of *Babesia equi* in equine in this area and -requesting steps to avoid such status for better clinical management of the sub clinically infected equines.

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