Haematological and Biochemical Characterization of Bubaline Trypanosomosis in Mumbai Region of India

P.G. Birajdar[1], J.G. Gudewar[1,*], H.Y. Palampalle[1], S.H. Dalvi[2] and M.L. Gatne[1]

[1]*Department of Veterinary Parasitology and* [2]*Department of Veterinary Biochemistry, Bombay Veterinary College, Parel, Mumbai-400 012, India*

Abstract: The present study was based on observations on 17 cases of *Trypanosoma evansi* infection in buffaloes diagnosed by blood smear examination. The degree of parasitaemia revealed heavy (64.70%), moderate (23.52%) and mild (11.76%) infections in buffaloes.Haematological analysis revealed subnormal erythrocytic count and haemoglobin in 70.58% buffaloes. Leukocytosis was evident in 70.58% buffaloes with neutrophilia relatively associated with lymphocytopenia.Blood glucose level of 15 hypoglycaemic buffaloes ranged between 27 to 49.05 gm/dl with an average of 39.35 gm/dl. The comparative analysis of the degree of hypoglycaemia with parasitaemia revealed positive correlation between two parameters. Biochemical analysis of sera and blood samples showed increase level of BUN and serum creatinine in 17.64% buffaloes.

Keywords: *Trypanosoma evansi*, Buffaloes, Haematology, Biochemistry.

INTRODUCTION

The disease "Surra" caused by *Trypanosoma evansi*, is widely prevalent in India affecting huge population of equines, canines and bovines in India [1]. While, the disease is usually very pathogenic even leading to mortality in untreated horses, camel and dogs, it is often subclinical in bovines which act as reservoirs for susceptible species of host in the mixed population [2]. Trypanosomosis, anarthropod borne disease, runs a chronic course in buffaloes, affecting the overall performance of the animals [3].

The present study was conducted on buffaloes naturally infected with *Trypanosoma evansi* to characterize clinical nature of the bubaline trypanosomosis in Mumbai with haematological and biochemical profiles.

MATERIALS AND METHODS

Identification of Parasite and Clinical Characterization of Disease

The blood smears collected during height of temperature from peripheral circulation (from eartip) and stained by Leishman stain [4] were screened for identification of *T. evansi* on the basis of morphology and micrometry [5]. The intensity of parasitaemia was noted as mild (1-5 organisms/field), moderate (6-10 organisms/field) and high (11 and more organisms/field) under high power to assess severity of the infection. The buffaloes showing pyrexia were thoroughly examined to note other concurrent symptoms for clinical characterization of the disease in buffaloes.

Haematological and Biochemical Profiles of Bubaline Trypanosomosis

The blood samples from 17 positive cases collected in 2% EDTA vials were processed immediately to note the haematological parameters. Also the blood samples were collected in Sodium fluoride (10:1) vials for blood glucose estimation. The sera samples collected in clean, dry, sterilized glass vials were preserved at –20^{o} C after adding merthiolate till used for biochemical analysis.

RESULTS AND DISCUSSION

Identification of the Organism and Intensity of Parasitemia

The trypanosomes encountered in the blood smears were measured 18µ to 36µ (average, 25.2µ) in length and 2µ to 4µ (average 2.9 µ) in width. The variations in the dimensions indicate pleomorphic nature of the parasites in the blood of infected buffaloes. The intensity of parasitaemia was noted in the present study with the intention to find out correlation, if any, between parasitaemia, level of hypoglycemia and degree of deviation in haematological and biochemical profiles. Among the seventeen buffaloes positive for *Trypanosoma evansi,* two (11.76%) showed mild parasitaemia, four (23.52%) had moderate level ofparasitaemia and remaining eleven (64.70%) revealed high level of parasitaemia.

*Address correspondence to this author at the Department of Veterinary Parasitology, Bombay Veterinary College, Parel, Mumbai-400 012, India; Tel: 022 24131180; Fax: 02224130162; E-mail: jagdishgudewar@gmail.com

ISSN: 1927-5196 / E-ISSN: 1927-520X/14

Clinical Characterization of Bubaline Trypanosomosis

Clinical characterization of trypanosomosis was done on the basis of clinical signs and physical examination of seventeen buffaloes tested positive for *Trypanosoma evansi* parasites.

Sunken and red eyes were the predominant sign exhibited by all (100%) positive buffaloes. Dull/sleepy appearance (12 cases: 70.58%), increase in body secretions (12 cases: 70.58%) and nervous signs (9 cases: 52.94%) *viz.* head pressing, disinclination to move, muscle twitching and inco-ordination of movements, were predominantly noted in positive cases. In the present study all the buffaloes showing nervous signs had higher degree of hypoglycaemia as compared to other infected buffaloes without nervous signs. Physical examination of the infected buffaloes revealed pyrexia (100%), swelling of lymph node (94.11%), high respiratory rate (82.35%) and pulse rate (52.94%). Although lymph node swelling was not apparent in the infected buffaloes, the palpation of prescapular lymph node revealed distinct enlargement in 16 out of 17 buffaloes. These clinical findings are in general agreement with the observations of Soulsby [5] and Bhatia *et al*. [1].

Haematological Profile of Bubaline Trypanosomosis (Table 1)

The haematogical analysis of blood samples revealed that 12 (70.58%) out of 17 buffaloes had either low percentage of haemoglobin or subnormal values of TEC suggesting anemic condition. Anaemic condition (pale mucus membrane) was also evident clinically in eight (47.05%) buffaloes. Further analysis of these 12 cases to note erythrocyte indices revealed hypochromic trend in 10 (83.33%) buffaloes and in the other two (16.67%) buffaloes MCHC levels were within the normal range (Normochromic). As regards MCV levels of the 12 buffaloes, six (35.29%) buffaloes showed macrocytic type (Regenerative), five (41.66%) showed normocytic type (Non-regenerative) and one (8.33%) buffalo had microcytic type of anaemia. The discrepancy in the anemic trend could be attributed to variety of unrelated factors *viz.* concommitant diseases like Foot and Mouth disease [5], anthrax, pasturellosis, milk fever and avitaminosis [1, 6], nutritional status [6] and age of the host.

Table 1: Haematological and Biochemical Values of Buffaloes Infected with *T. evansi*

Case no.	TEC 10^6/cumm	Hb gm/dl	PCV %	MCH pg	MCV fl	MCHC gm/dl	TLC 10^3/cumm	BUN mg/dl	Serum creatinine mg/dl
1	7.23	9.2	31.4	12.72	43.43	29.29	25.9	23.2	7.05
2	6.74	9.6	29.5	14.29	43.76	32.54	5.52	26.08	6.97
3	6.56	10.1	32	15.39	48.78	31.56	5.32	22.36	2.7
4	6.42	9.7	31.9	15.1	49.68	30.4	5.27	20.86	1.48
5	5.98	10	35.3	16.8	58.69	28.32	80.4	56.86	4.06
6	6.38	10.6	36.8	16.61	57.68	28.8	30.2	18.5	1.63
7	4.68	10.9	30.9	23.29	66.02	35.27	7.86	21.4	1.93
8	7.21	10.3	39.7	14.28	55.06	25.94	16.4	24.14	2.92
9	7.46	11.3	36.4	15.14	48.79	31.04	17.5	28.42	2.5
10	7.04	10.2	33.6	14.48	47.72	30.35	13.6	26.55	2.63
11	6.91	9.3	37.7	13.45	54.55	24.66	15.5	23.81	1.92
12	5.94	8.5	24.2	14.3	40.74	35.1	16.4	31.25	2.88
13	7.38	13.6	35.8	18.42	48.5	37.98	16.2	27	2.14
14	7.49	12.8	46	17.08	61.4	27.82	40.5	13.68	1.37
15	6.87	12.2	31.4	17.75	45.7	38.85	9.16	21.4	1.64
16	6.51	11.4	38.2	17.51	58.67	29.84	12.6	34.21	3.1
17	6.29	11.5	37	18.28	58.82	31.1	23.5	28.34	2.67
Avg.	**6.65**	**10.65**	**34.57**	**16.17**	**52.23**	**31.1**	**20.11**	**26.36**	**2.92**

Table 2: Intensity of Parasitaemia in Relation to Degree of Hypoglycaemia

Level of Hypoglycaemia gm/dl	No. of Trypanosomes / High power field	No. of positive cases (%)
Low (40-50 gm/dl)	3 – 17 (Avg. 10.87)	8 (47.05%)
Moderate (30-40 gm/dl)	7 – 48 (Avg. 28.5)	4 (23.52%)
Heavy (20-30 gm/dl)	72 – 88 (Avg. 80.66)	3 (17.64%)

Leukocytosis was evident in 12 (70.58%) buffaloes; whereas three (17.64%) buffaloes showed leukocytopaenia and in remaining two (11.76%) buffaloes the counts were within the normal range. Wide variation in the leukocyte counts detected in the present study might be attributed to concurrent bacterial (leukocytosis) or viral (leukocytopaenia) infections. Thus the TLC countsnoted here do not indicate conclusive trend. The differential leukocytic counts revealed neutrophilia in 13 (76.47%) buffaloes, lymphocytopenia in 13 (76.47%) buffaloes, eosinophilia in six (35.29%) buffaloes and monocytosis in five (29.41%) buffaloes. Eosinophilia usually indicates either parasite infestation or allergic conditions and monocytosis suggest chronic illness [7], but in the present study only 35.29% buffaloes showed slightly higher eosinophilic counts. Monocytosis in 29.41% buffaloes indicate chronic nature of the infection which is a clinical feature of bubaline trypanosomosis. Since *Trypanosoma evansi* are intercellular haemoflagellates occurring primarily in plasma, the conclusive changes in differential counts may not be seen unless and until the organisms invade the internal organs and associated body fluids [8]. Thrombocyte counts were low (trombocytopaenia) in four (23.52%) buffaloes very high (trombocytosis) in eight (47.05%) buffaloes and within the reference limit in remaining five (29.41) buffaloes.

Out of 17 buffaloes, 15 (88.23%) showed subnormal levels of blood glucose which ranged from 27 gm/dl to 49.45 gm/dl with an average of 39.35 gm/dl. Three (17.04%) buffaloes showed substantial difference in blood glucose level while four (23.52%) buffaloes were moderately hypoglycaemic and eight (47.05%) buffaloes showed marginal drop in blood glucose level. The group of buffaloes with high levels of parasitaemia revealed blood glucose levels ranging from 27 gm/dl to 49.05 gm/dl with average 37.64 gm/dl. Similarly the blood glucose levels of 39 gm/dl to 54.66 gm/dl (average 46.09 gm/dl) were obtained in the buffaloes with moderate level of parasitaemia and in buffaloes with low level of parasitaemia the blood glucose level was varied from 46.53 gm/dl to 51.46 gm/dl (average 48.99 gm/dl). Thus the analysis of degree of hypoglycaemia (blood glucose level) with respect to level of parasitaemia revealed positive correlation (Table **2**). Since, the level of parasitaemia was found to have inversely proportional impact on blood glucose levels, which in turn have direct influence on the milk yield, it can be tentatively concluded that the level of parasitaemia has negative correlation with milk yield.

Biochemical Profile of Bubaline Trypanosomosis (Table 1)

The biochemical profile pertaining to liver function test did not show any conclusive deviation from the normal reference values. Although occurrence of trypanosomes in tissues of various organs have been reported [8], there is no direct reference in the literature stating its adverse effects on liver functions. As regards bilirubin, albumin and globulin levels, there was no significant deviation from the normal values. Thus, in general biochemical profile does not point out any serious affection of liver. Two parameters *viz*., BUN and Serum Creatinine were also investigated to note kidney profiles of infected buffaloes. Three (17.64%) buffaloes revealed elevated levels of serum creatinine (4.06 to 7.05 mg/dl) and one of them (5.88%) showed higher level of BUN (56.86 mg/dl) indicating kidney malfunction. Although, it is not a consistent finding, it can be attributed to kidney damage due to deposition of antigen antibody complexes in the glomeruli or large scale destruction of erythrocytes.

REFERENCES

[1] Bhatia BB, Pathak KML, Banerjee, DP. Text Book of Veterinary Parasitology, Kalyani Publisher, Ludhiana 2006.

[2] Dixit P, Dixit A, Rajput DV. Surra in bovines: An overview. Pashudhan 2007; 33: 3-4.

[3] Shyma KP, Gupta SK, Singh A, Chaudhri SS. Efficiency of monoclonal antibody based latex agglutination test in detecting *Trypanosoma evansi* under field conditions for improving the productivity in buffaloes. Buffalo Bulletin 2012; 31: 163-72.

[4] Rathore VS, Sengar YS. Diagnostic Parasitology, Pointer Publishers, Jaipur 2005.

[5] Soulsby EJL. Helminths, arthropods and protozoa of domesticated animals 7th ed. Bailliere Tindall, London 1982.

[6] Pathak KML. Proceedings of short course on animal surra. Bikaner, Rajasthan, India 1997; p. 2-4.

[7] Benjamin MM. Outline of Veterinary Clinical Pathology, 3rd ed. Kalyani Publisher, New Delhi 1985.

[8] Pathak KML, Singh N. Animal trypanosomosis. Intas Polivet 2005; 6(2): 194-99.

Received on 28-04-2014 Accepted on 12-05-2014 Published on 18-06-2014

DOI: http://dx.doi.org/10.6000/1927-520X.2014.03.02.5