

Research Article

Antioxidant Status and Electrocardiographic Changes in Buffaloes with *Trypanosoma Evansi* Infection

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Abstract

Fourteen buffaloes suffering from *Trypanosoma evansi* infection were selected for the study. Clinical trypanosomosis was diagnosed by morphology of the *Trypanosoma evansi* organisms in stained blood smears. All the infected buffaloes showed reduced haemoglobin, packed cell volume, red blood cell count, leukocyte count, lymphocytes and reduced glutathione peroxidase concentration when compared with the apparently healthy group. Recorded abnormal electrocardiographic findings were wide and peaked P wave, peaked T wave and prolonged QT interval. In conclusion, natural *Trypanosoma evansi* infection in buffaloes leads to compromisation of antioxidant defence of the body which results in oxidative damage along with the reduced cardiac output and anaemia. The present study findings support the requirement of immune supplements during the *Trypanosoma evansi* infection in buffaloes.

Keywords: Buffaloes, Hematology, *Trypanosoma evansi*, Antioxidant, Electrocardiography, Andhra Pradesh

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Introduction

Huge literature is available on haematological, biochemical and histopathological changes on the *Trypanosoma evansi* infection in laboratory animals [1]. During the natural *T. evansi* infection, studies were carried out on prevalence, hematological and biochemical parameters in cattle, camel, donkeys, dogs and cats in India [2]. Individual animal antioxidant systems consist of SOD, catalase, GSHPx and etc. During the haemoprotozoan infections, the blood protozoans metabolize hemoglobin and produce free radicals which in turn cause increases the oxidative stress [3]. It is essential to record the antioxidant levels in disease condition to formulate the best therapeutic options. Information regarding the antioxidant levels and electrocardiographic abnormalities was not available in buffaloes infected with *Trypanosoma evansi*.

Materials and Methods

The present study was carried out on the buffaloes presented to the Veterinary Clinical Complex, College of Veterinary Science, Proddatur from 2015 to 2016. Buffaloes with the history of reduced milk yield, recurrent pyrexia, corneal opacity, emaciation and ocular discharges were screened for the *Trypanosoma evansi* infection. Electrocardiography was carried out according to the standard base apex lead system. All ECGs were recorded on a three - channel electrocardiographic machine with 25 mm/sec paper speed and calibrated 10 mm/mV [4]. Whole blood and peripheral blood smears were collected for the laboratory analysis. Initial diagnosis of *T. evansi* was done by wet blood film examination followed by confirmation was done by examination of the Geimsa's stained blood smears. Whole blood was collected and processed for estimation of routine haematological parameters as per standard methods. Whole blood was collected from the six infected buffaloes and the six apparently healthy buffaloes as a control for estimation of glutathione peroxidase levels. Haemolysate was prepared from the whole blood for the estimation of the glutathione peroxidase levels according to the colorimetric assay kit method (Medauxin, Bangalore).

Results and Discussion

Fourteen buffaloes were identified that they were suffering from clinical trypanosomosis. Confirmation of the infection was done by morphology and micrometry of the *T. evansi* in the stained blood smears. Most of the buffaloes

showed non-specific signs and commonly they have a reduction in milk yield, bilateral lacrimation, elevated respiratory rate and low body condition score. During the electrocardiography study, abnormal electro cardiac findings include wide P wave, peaked P wave, low voltage QRS amplitude, peaked T wave and prolonged QT interval (**Figures 1-4**). **Table 1 and 2** shows the haematological changes and electrocardiographic changes in the infected group.

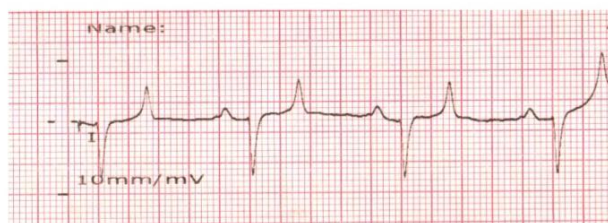


Figure 1: Wide P wave



Figure 2: Spiked T wave and tachycardia



Figure 3: Cardiac Arrhythmia

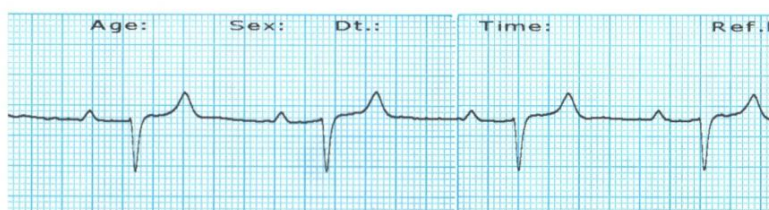


Figure 4: Wide T wave

Table 1 Laboratory findings in *Trypanosoma evansi* infected buffaloes

S. No	Parameters	Mean \pm S.E.	Range
1.	Hb (g/dL)	8.12 \pm 0.28	7.86 to 8.41
2.	PCV (%)	24.66 \pm 1.70	22.4 to 26.7
3.	TEC $\times 10^6$ /cumm	4.23 \pm 0.91	4.08 to 5.12
4.	TLC /cumm	8240.45 \pm 66.8	7100 to 8900
5.	Neutrophils (%)	29.11 \pm 1.2	27 to 33
6.	Lymphocytes (%)	63.45 \pm 1.2	59 to 65
7.	Eosinophils (%)	6.66 \pm 1.2	4 to 7
8.	Monocytes (%)	2.01 \pm 1.2	0 to 3
9.	Glutathione peroxides (units/ml)	22.0 \pm 3.2	11 to 31

Table 2 Electrocardiographic findings in *Trypanosoma evansi* infected buffaloes

S. No	Parameters	Mean \pm S.E.	Range
1.	P wave amplitude (mV)	0.241 \pm 0.02	0.10 to 0.30
2.	R wave amplitude (mV)	1.150 \pm 0.69	0.90 to 1.50
3.	T wave amplitude (mV)	0.583 \pm 0.03	0.40 to 0.70
4.	P wave duration (sec)	0.070 \pm 0.06	0.06 to 0.08
5.	QRS wave duration (sec)	0.068 \pm 0.01	0.05 to 0.08
6.	T wave duration (sec)	0.106 \pm 0.01	0.08 to 0.16
7.	P-R interval (sec)	0.246 \pm 0.01	0.20 to 0.32
8.	Q-T interval (sec)	0.390 \pm 0.01	0.32 to 0.44
9.	Heart rate (bpm)	72.50 \pm 1.69	65.0 to 83.0

Reduction in the haemoglobin, packed cell volume and total erythrocyte count was noticed. But the reductions in the levels were not very low when compared to the natural trypanosomiasis in cattle and dogs. During trypanosomiasis, red blood cell membranes lost their membrane integrity because of reduced glutathione levels which result in the destruction of the red blood cell count and anemia [5]. The observed reduction in the total leucocytes count might be due to results of immune-suppression. These changes occur as a result of an increase in the activity of the mononuclear phagocytic system [6]. Recorded eosinophilia is a feature of parasitic infections and is associated with immediate-type hypersensitivity reactions. Reported haematological abnormalities were in association with the previous studies of trypanosomiasis in different animals in the globe [7, 8]. In the present study, serum GSH-Px activity of infected buffaloes (22 ± 3.2 unit/ml) was lower than the control group (47.3 ± 4.19 unit/ml). Recorded findings in the present study were in association with the previous reports in laboratory animals infected with *T. evansi* [9]. During bovine trypanosomiasis, animals continue the feed intake but glucose was utilized by the parasite, it affects the energy deficit in the body finally leads to catabolism of body fat and protein and the end product of the development of the ketosis. Development of the cardiac arrhythmias might be due to anemia and it is one of the triggering factors for a cardiovascular collapse in trypanosomiasis [10]. Compare with the healthy adult buffaloes and cattle in the present location, *Trypanosoma* infected buffaloes showed increased P wave amplitude and duration, T wave duration and amplitude when compared with the normal values [11]. It might be due to changes in the left and right atrial myocardial changes and variations in the T wave indicates the serum electrolyte imbalances especially potassium and sodium. Hyperkalemia is one of the important findings in the previous literature which supports the electrocardiographic changes in the buffaloes in the present study.

Acknowledgements

The authors acknowledge the authorities of Sri Venkateswara Veterinary University, Tirupati for providing facilities to carry out this research.

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Publication History

Received 09th Nov 2017
Revised 24th Nov 2017
Accepted 07th Dec 2017
Online 30th Dec 2017