International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(3): 3110-3112

Received: 18-03-2018
Accepted: 21-04-2018

Devadevi N
Department of Veterinary Medicine, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry

Rajkumar K
Department of Veterinary Medicine, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry

Vijaylakshmi P
Department of Veterinary Medicine, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry

Correspondence
Devadevi N
Department of Veterinary Medicine, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry

Efficacy of buparavaquone in the treatment of bovine benign theileriosis

Devadevi N, Rajkumar K and Vijaylakshmi P

Abstract
The aim of the study was to assess the effectiveness of the buparvaquone in cattle with theileriosis. The study revealed, most of the animals suffer from subclinical or chronic form of theileriosis, which is caused by *Theileria orientalis* conformed by PCR. Bovine benign theileriosis (BBT) is a mild or subclinical form of disease, which is indicated by the clinical signs and severe anemic haemogram. Inj. Buparavaquone @ 2.5 mg/kg body weight by intramuscular route as single dose has effectively reduced the clinical signs and also improved the heamatology, serum biochemistry and also effectively removed the *Theileria orientalis* organism from the circulatory system of the animals in 21days post treatment and showed 100% recovery.

Keywords: theileriosis, buparavaquone, cattle

Introduction
The study conducted to assess the effectiveness and recovery rate of buparvaquone in cattle with theileriosis. *Theileria sergenti / buffeli / orientalis* caused mild, subclinical or asymptomatic disease in cattle known as bovine benign theileriosis(Uilenberg 1981). The reports of Kakuda *et al.* (1998) [4] said that Chitose type of *Theileria orientalis* found throughout the world and do not cause disease unless the cattle were affected by stress such as deficiency of nutrition's, scarcity of fodder, climatic conditions, other pathogens or parturition. Mchardy (1985) [5] reported buparvaquone is chemically 2 trans (4-t-butyl cyclohexyl) methyl-3-hydroxy 1, 4 naphthoquinone is highly efficient in the treatment of east coast fever. He also found that buparvaquone and related cyclohexyl analogues had greater resistance to metabolic degradation thus increasing the *in vivo* efficacy against *Theileria* organism but Hawa *et al.* (1988) [3] treated the *Theileria* affected cattle with buparavaquone @ 2.5 mg/kg body weight deep intramuscular injection which lead to reduction of temperature and recovery from theileriosis and Dhar *et al.* (1987) [2] found that the percentage of schizonts fell to < 1 per cent in 12 days post treatment with buparvaquone.

Materials and Methods
The cattle were randomly selected, which were brought to Large Animal Medicine Unit, TVCC, RIVER; with clinical signs suggestive of theileriosis like anorexia, fever, lethargy, congested / pale mucosa, lymphadenomegaly, bruxism, lameness and tick infestation were screened and included under clinical study group. As per Radostitis *et al.*, 2010, the cattle were subjected to physical examination and special examination which includes details regarding appetite and milk production and examination of cattle for rectal temperature, lymph node, mucus membrane, diarrhoea, nasal discharge, lacrimation, dyspnoea, bruxism, tachycardia, nervous signs, lameness and tick infestation and results obtained were documented. Bloods was collected for hematology and were estimated as per standard methods (Schalm *et al*., 2000) [12] for Haemoglobin (Hb), Red Blood Cell (RBC) count, Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC), Total Leucocyte Count (TLC), Differential Leucocyte Count (DLC) and Thrombocyte count. Serum was subjected to estimation of Total protein (TP), Albumin, Globulin, Creatinine, Aspartate transferase (AST) and Alanine Amino Transferase (ALT) using semi auto-analyzer (Secoman). For PCR, DNA was isolated from the blood collected in Acid citrate dextrose solution (Hi Media) as per the standard DNA extraction procedure described below (Sambrook and Russel, 2001). PCR was standardized using genus (*Theileria*)

specific and species (*Theileria orientalis*) specific primers as described by Oliveira *et al*. (1995) and Tanaka *et al.* (1993) [16], respectively. A group of six animals were taken and was treated with Inj. Buparvaquone @ 2.5 mg/kg body weight by intramuscular route as single dose (Aulakh and Singla, 2006) [1]. The characters under study were evaluated on day 0 and on 21st for checking the effectiveness of the drug. The other supportive treatment like, for pyrexia Inj. Meloxicam @ 0.5mg/kg body weight intramuscular route. For anorexia were supported with dextrose 1000ml intravenous route. Cattle with tick infestation were treated with Permethrin (Tikkil®) 0.1%. The cattle were observed for a period of 3 weeks following cessation of treatment. The data obtained in the study were subjected to statistical analysis as described by Snedecor and Cochran (1994) [15] and discussed.

Result

Efficacy of buparvaquone was evaluated by pre-treatment and post-treatment through anamnesis, clinical signs, haematology, serum biochemistry and PCR. The drugs effectively reduced the clinical manifestations and improved the body condition, appetite and also increased the milk production in dairy cattle, anorectic animal starting feeding after 2day and fever start subsiding from next day. Animal took two weeks to recover from lethargy, congested / pale mucosa, lymphadenomegaly, bruxism and lameness. The mean haemogram and serum biochemistry of cattle with theileriosis before and after treatment were given the Table 1 and Table 2.

Table 1: Evaluation of treatment with buparvaquone on haematology in cattle with theileriosis

Parameter	Pre treatment (n=6) 0 day	Post treatment (n=6) 21st day	"t"
Haemoglobin (g/dl)	10.07± 0.65	11.5±0.63	2.56**
Packed Cell Volume (%)	28.5± 1.59	32.07± 0.87	3.62**
RBC(10^6cells/mm^3)	5.03±0.25	6.17±0.24	5.88**
MCV (fl)	56.57± 0.73	51.93±0.82	6.93**
MCH (pg)	19.9 ± 0.51	18.602±1.03	2.5*
MCHC (%)	35.27± 0.64	35.74±1.03	0.52^{NS}
WBC(10^3cells/mm$^{3)}$	13.36± 1.77	12.25±0.26	0.62^{NS}
Neutrophil (10^3 cells/mm^3)	4.14±1.13	3.62±0.21	0.55^{NS}
Lymphocyte(10^3cells/mm^3)	8.9±1.7	8.45±0.18	0.25^{NS}
Eosinophil (10^3 cells/mm^3)	0.26±0.13	0.16±0.079	0.72^{NS}
Monocyte(10^3 cells/mm^3)	0.0± 0.0	0.0±0.0	1.00^{NS}
Platelet (10^5cellls/mm^3)	1.04± 0.19	2.26±0.38	3.08*

**Significant (P<0.01), * Significant (P<0.05), NS-Not significant (P>0.05)

Table 2: Evaluation of treatment with buparvaquone on serum biochemical profile in cattle with theileriosis

Parameter	Pretreatment (n=6) 0 day	Pretreatment (n=6) 21st day	"t"
Total protein (g/L)	87.93±11.5	75.89± 4.1	1.39^{NS}
Albumin (g/L)	18.68±4.1	29.82±2.0	2.13 *
Globulin (g/L)	68.95±11.8	46.08±3.1	2.24 *
A:G ratio	0.36±0.14	0.66± 0.06	1.67^{NS}
Creatinine (mg/dl)	1.27±0.37	1.17±0.27	0.98^{NS}
ALT (IU/L)	66.5±14.4	48.88±10.3	2.6 *
AST (IU/L)	136.44±17.1	99.68±6.1	2.04 *

**Significant (P<0.01), *Significant (P<0.05), NS-Not significant (P>0.05)

Buparvaquone effectively and significantly (P<0.01) increased the Hb, PCV, TEC and platelet count. The mean MCV and MCH were significantly less in compared with the treatment. The mean values of MCHC, WBC, neutrophils, lymphocytes, eosinophils and monocyte did not differ significantly. Buparvaquone effectively (P<0.05) increased the albumin and there was a significant (P<0.05) decrease in globulin, ALT and AST. Other biochemical parameters like total protein, albumin: globulin ratio and creatinine showed no significant change in their mean values. In PCR, the buparvaquone effectively (100 per cent) eliminate the *Theileria orientalis* organism from the circulatory system of the animal.

Discussion

From the study buparvaquone is found effective at the dose rate of 2.5 mg/ kg body weight intramuscular route as single dose, which is in agreement with Aulakh and Singla (2006) [1], Sharma and Mishra (1990) [13], Singh *et al*. (1993) and Morrison (1998) [6]. In the present study, haematology parameters significantly (P<0.01) increased the Hb, PCV, TEC and platelet count in buparvaquone treatment which is in agreement with Nasir (2000) [8], Aulakh and Singla (2006) [1] and Naik *et al*. (2010) [7]. The present studied indicated a single dose of buparvaquone @ 2.5 mg/kg body weight intramuscular administration showed 100 percent recovery and eliminate the *Theileria orientalis* organism from the circulation which is in agreement with Sharma and Mishra, 1990 [13] and Singh *et al.*, 1993, a single dose of buparvaquone @ 2.5 mg/kg body weight intramuscular administered during the ascending phase of parasitaemia cured all infected calves while all untreated infected calves died. But Morrison (1998) [6] stated that cross breed cows with single dose of Inj. Buparvaquone @ 2.5 mg/kg body weight intramuscular showed 98.8 % recovery and Nasir (2000) [8] stated that buparvaquone was found to be highly effective in theileriosis. Naik *et al*. (2010) [7] reported that the haematological values raised on the 15th day of post treatment with buparvaquone in cattle infected with *Theileria* spp and in the present study, the post treatment effect was evaluated on 21st day post which showed complete elimination of the *Theileria* organism from the circulation.

Conclusion

Buparavaquone was found to be 100 percent effective in the treatment of bovine benign theileriosis which is indicated by

the significant increase in the hematology and also elimination of *Theileria orientalis* organism from the circulation.

Acknowledgement
The authors are thankful to the Dean, Rajiv Gandhi Institute of Veterinary Education and Research for providing necessary facility to carry out the research.

References

1. Aulakh GS, Singla LD. Clinico-haematobiochemical observations on bovines naturally infected with *Theileria annulata*. J. Vet. Parasitol, 2006; 20:49-52.8.
2. Dhar S, Mallick KP, Bhushan C, Malhotra DV, Gautam OP. Observation on *Theileria annulata* infection in *Hyalomma anatolicum anatolicum* adult tick. Indian Vet. J. 1987; 64:370-373.
3. Hawa N, Rae DG, Younis S, Mahadi W, Ibrahim and Al-Wahab W. Efficacy of parvaquone in the treatment of naturally occurring theileriosis in cattle. Trop. Anim. Hlth. Prod, 1988; 20:130-136.
4. Kakuda T, Shiki M, Kubota S, Sugimoto C, Brown WC, Kosum C, et al. Phylogeny of benign *Theileria* species from cattle in Thailand China and the U.S.A. based on the major piroplasm surface protein and small subunit ribosomal RNA genes. Int. J. Parasitol, 1998; 28:1261-7.
5. Mchardy N, Morgan DWT. Treatment of *Theileria annulata* infection in calves with parvaquone. Res. Vet. Sci. 1985; 39:1-4.
6. Morrison WI. The Merck Veterinary Manual. Edn. 8th, Merck and Co. Inc. Whitehouse Station NJ, USA. 1998, 31-33.
7. Naik G, Ananda KJ and Rani KB. Theileriosis in calves and its successful treatment. Veterinary World, 2010; 3:191.
8. Nasir AA. Effects of theileriosis on blood parameters of exotic cattle and efficacy of buparvaquone and oxytetracycline. Pak. J Biol. Sci. 2000; 3:1028-1028.
9. Olivera CD, Van M, Habela M.A, Jacquiet P and Jongejan F. Detection of *Theileria annulata* in blood samples of carrier cattle by PCR. J Vet. Microbiol. 1995; 33:2665-2669.
10. Radostits OM, Gay CC, Hinchcliff KW, Constable PD. Veterinary Medicine, A text book of the diseases of cattle, sheep, goats, pigs and horses. Edn.10th, Book power Saunders, London, New York, 2010, 1526-1531.
11. Sambrook J, Russel DW. Molecular cloning – A laboratory manual. Edn.3rd, Cold Spring Harbor Laboratory Press, New York, 2001, 6-11.
12. Schalm OW, Weiss Douglas J, Wardrop KJ. Veterinary Haematology. Edn.6th, Wiley Blackwell publishing, U.S.A. 2000, 799-809.
13. Sharma NN, Mishra AK. Treatment of Bovine tropical theileriosis with buparvaquone. Trop. Anim. Health Prod, 1990; 22:63-65.
14. Singh J, Gill JS, Kwatra MS, Sharma KK. Treatment of theileriosis in crossbred cattle on the Punjab. Trop. Anim. Hlth. Prod. 1993; 25:75-78.16.17.
15. Snedecor GW, Cochran WG. Statistical methods. Edn. 8th, Iowa State University Press, USA, 1994.
16. Tanaka M, Onoe S, Matsuba T, Katayama S, Yamanaka M, Yonemichi H *et al*. Detection of *Theileria sergenti* infection in cattle by polymerase chain reaction amplification of parasitic-specific DNA. J Clin. Microbio. 1993; 31:2565-2569.
17. Uilenberg G. *Theileria* species of domestic livestock. In: Irvin AD, Cunninham, MP, Young, AS. (Eds.), Advances in the Controlof Theileriosis. Martinus Nijhoff Publishers, Hage, The Netherlands, 1981, 4-37.