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Research Article

HAEMATO-BIOCHEMICAL AND THERAPEUTIC STUDIES IN BUFFALOES WITH RESPIRATORY DISEASE

PRAVEEN KUMAR*, ASHOK KUMAR, RAJENDRA YADAV and PARVEEN GOEL

Department of Veterinary Medicine, College of Veterinary Sciences
Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar-125 004, India

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ABSTRACT

The present study was conducted on 24 buffaloes brought to the university clinic with the complaint of anorexia, fever, nasal discharge, coughing, dyspnoea and abnormal lung sounds on auscultation of thoracic area. Based on clinical signs and symptoms, these buffaloes were found to be suffering from respiratory diseases. All these animals were divided in three groups (groups I, II and III) with eight animals in each group and were treated with ceftiofur@2.2 mg/kg b. wt, levofloxacin@4 mg/kg b. wt and moxifloxacin@5 mg/kg b. wt i.m., respectively once a day along with supportive therapy for 3-7 days depending on remission of clinical signs and symptoms. Haemato-biochemical studies revealed increased total erythrocyte count, total leucocyte count, neutrophils, alanine transaminase, aspartate transaminase and decreased lymphocytes, calcium and phosphorus levels in the affected animals. On the basis of remission of clinical signs and symptoms, ceftiofur was found to be the most effective drug followed by levofloxacin and moxifloxacin.

Key words: Ceftiofur, levofloxacin, moxifloxacin, respiratory disease

Respiratory system diseases are major health problems occurring worldwide in both dairy and feedlot animals and are responsible for high morbidity and mortality rate. These diseases have been reported to cause heavy economic losses in terms of drug and veterinary costs, extra labour and production losses (Gagea *et al*., 2006). Main agents causing respiratory diseases include *Pasteurella multocida, Mannheimia haemolytica* and *Histophilus somni,* bovine herpesvirus 1, bovine respiratory syncytial virus, bovine viral diarrhoea virus and parainfluenza-3 virus (Radostits *et al*., 2007). Various antimicrobials have been tested and used with variable efficacy for treatment of respiratory diseases. The present paper reports haemato-biochemical changes and therapeutic efficacy of ceftiofur, levofloxacin and moxifloxacin in clinical cases of respiratory diseases in buffaloes.

MATERIALS AND METHODS

The study was conducted in buffaloes presented at Teaching Veterinary Clinical Complex of the University. A total of 24 buffaloes diagnosed to be suffering from respiratory diseases based on history and clinical signs and symptoms such as depression, anorexia, temperature and respiratory distress along with coughing, nasal discharge and abnormal auscultation findings of lungs were included in this study. Eight apparently healthy buffaloes were also included in this study as control group.

Five ml of blood was collected aseptically using EDTA coated sterile vials for determination of haematological parameters i.e. haemoglobin (Hb), packed cell volume (PCV), erythrocyte sedimentation rate (ESR), total erythrocyte count (TEC), total leucocyte count (TLC) and differential leucocyte count (DLC) by standard procedures (Weiss and Wardrop, 2011). Paired blood sample was also collected from these animals and serum was separated for biochemical analysis. The serum was used for analysis of alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP), calcium (Ca) and phosphorus (P) by fully automated random access clinical chemistry analyzer (EM 200^{TM} Erba Mannheim, Germany) using kits procured from Transasia Biomedical Limited.

To compare the therapeutic efficacy of ceftiofur, levofloxacin and moxifloxacin, these 24 buffaloes were randomized in three groups (groups I, II and III) with eight animals in each group. Ceftiofur@2.2 mg/kg b. wt. (group I), levofloxacin@4 mg/kg b. wt. (group II) and moxifloxacin@5 mg/kg b. wt. (group III) was administered once daily via the intramuscular route for 3-7 days depending on remission of clinical signs and symptoms. Additionally, the supportive therapy in the form of antihistaminics, non steroidal anti inflammatory drugs (NSAID's),

*Corresponding author: prvnsehlangia@gmail.com

respiratory stimulants, liver extract, multivitamins and corticosteroids was given in recommended doses where warranted. Post treatment collection of blood samples and clinical examination on day 3, 5 and 7 in different groups was also carried out for estimation of haemato-biochemical parameters and to evaluate the therapeutic efficacy. Therapeutic efficacy of the antibiotics used was evaluated based on the remission of clinical signs and symptoms along with trend towards regaining of normal values of haemato-biochemical parameters. Mean values were calculated, however, the data could not be statistically analysed further.

RESULTS AND DISCUSSION

Higher TEC, TLC and neutrophils values and lymphopenia were recorded in all the three groups of diseased animals as compared to healthy control group (Table 1). Biochemical estimation revealed an appreciable increase in ALT and AST values whereas decrease in Ca and P levels in affected animals of all groups as compared to healthy control group. No remarkable variation was observed in the values of Hb, PCV, ESR, eosinophils, monocytes and ALP in the affected buffaloes as compared to animals of control group. However, trend towards restoration of normal values of haemato-biochemical parameters was seen following antibiotic therapy in affected buffaloes after day 3, 5 and 7 of treatment with ceftiofur, levofloxacin and moxifloxacin, respectively (Table 1). Improvement was faster in ceftiofur treated group followed by levofloxacin and moxifloxacin treated groups.

High TEC values in the respiratory disease-affected buffaloes might be due to dehydration as also reported by Richeson *et al*. (2013). Leukocytosis and neutrophilia were recorded in the affected buffaloes as compared to healthy control animals. Similar findings have also been observed by other workers (Radostits *et al*., 2007; Caswell, 2014). Lymphopenia was recorded in the present study and it has also been reported earlier in clinical cases of respiratory diseases in cattle (Srikumaran *et al*., 2007). There was no noticeable variation encountered in the values of Hb, PCV, ESR, eosinophils, basophils and monocytes during the investigation. Similar types of findings were also reported by earlier workers (Abdullah *et al*., 2013; Richeson *et al*., 2013).

ALT and AST activities increased appreciably in all the affected buffaloes as compared to healthy animals (Table 1) which might be due to hepatic toxicosis as also opined by Abdullah *et al*. (2013). ALP activity was within the normal range in the affected

Table 1
Haemato biochemical observations (Mean S.E.) in healthy and respiratory disease affected buffaloes (n=8).

Parameters	Control group	Haemato biochemical observations in different groups at different intervals (days)								
		Ceftiofur treated group		Levofloxacin treated group			Moxifloxacin treated group			
		0	3	0	3	5	0	3	5	7
Hb (gm/dL)	12.37±0.9	11.85±2.35	12.15±1.04	11.1±2.97	11.51±1.14	11.87±0.84	11.35±1.25	11.42±0.46	11.51±0.66	11.78±0.63
PCV (%)	37.00±3.34	37.62±6.52	38.62±3.2	35±9.48	36.87±4.42	38.12±3.27	35.75±3.95	35.87±4.18	36.50±2.61	38.62±2.2
TEC ($\times 10^6$/µL)	5.90±0.28	6.71±0.55	7.42±0.45	6.53±0.86	6.76±0.39	7.07±0.3	6.33±0.58	6.38±0.53	6.65±0.42	6.97±0.2
ESR (mm/hr)	56.62±3.29	46.00±4.98	52.87±4.5	47.25±8.63	47.62±4.43	53.50±3.5	44.62±6.9	44.87±4.3	49.00±3.11	55.12±1.35
TLC ($\times 10^3$/µL)	10.78±0.62	14.27±2.97	11.45±1.05	13.51±2.35	12.53±1.57	11.25±0.71	12.35±1.7	12.20±1.01	11.58±0.77	11.11±0.69
DLC N (%)	31.75±4.02	61.12±21.12	40.50±7.7	54.5±9.05	50.75±3.95	42.50±4.95	61.50±15.07	58.50±10.12	51.25±9.67	46.80±9.0
DLC L (%)	65.50±4.4	36.25±21.03	56.00±7.3	43.25±9.6	46.75±4.02	55.37±5.5	36.80±15.72	39.30±10.35	46.60±9.62	51.00±8.9
DLC E (%)	1.25±0.88	0.87±0.99	1.75±1.67	1±1.41	1.25±0.88	0.875±1.12	0	1.12±0.83	1.50±0.53	1.00±1.06
DLC B (%)	0	0	0	0	0	0	0	0	0	0
DLC M (%)	1.50±0.92	1.75±0.70	1.75±1.03	1.25±1.48	1.25±0.70	1.25±1.03	1.63±1.84	1.25±0.7	0.62±0.51	1.125±0.64
ALT (U/L)	29.37±6.65	57.86±35.03	38.30±12.24	54.15±41.51	47.41±25.57	41.82±22.37	45.25±14.62	42.15±6.74	33.26±2.7	25.07±2.84
AST (U/L)	45.12±6.96	255.82±85.92	82.60±23.53	175.62±76.86	139.40±52.03	65.55±16	200.25±79.1	147.53±62.32	96.02±36.35	55.75±18.88
ALP (U/L)	182.60±20.33	239.37±189	170.40±62.57	410.37±466.30	235.70±204.30	144.00±73.60	310.12±281.10	261.25±178.64	186.00±111.20	142.46±66.32
Ca (mg/dL)	10.47±1.37	6.61±2.71	9.68±1.15	6.28±1.87	7.38±1.15	10.30±0.57	6.625±1.33	7.11±0.85	8.45±0.75	10.29±0.7
P (mg/dL)	6.31±0.85	4.48±1.68	5.97±0.8	2.62±0.86	4.60±0.75	7.03±0.65	5.38±2.95	5.71±2.3	6.28±1.29	7.31±0.85

Hb=Haemoglobin; PCV=Packed cell volume; TEC=Total erythrocytic count; ESR=Erythrocytic sedimentation rate; TLC=Total leucocyte count; DLC=Differential leucocyte count; ALT= Alanine transaminase; AST=Aspartate transaminase; ALP=Alkaline phosphatase; Ca=Calcium; P=Phosphorus

buffaloes, consistent with earlier reports of Radostits *et al*. (2007) and Ragbetli *et al*. (2010). Decreased levels of serum Ca and P were found in affected animals in present study which might be associated with anorexia and hypoalbuminaemia. Similar findings have also been reported by Abdullah *et al*. (2013). Following treatment there was an increase in levels of Ca and P (Table 1) in majority of buffaloes indicating a good response to the treatment and restoration of appetite of the animals.

The therapeutic regimen used in the present investigation comprised of three groups of antibiotics along with supportive measures, at times determined by clinical observations. Ceftiofur showed recovery in affected buffaloes in 3 days as evidenced by remission of clinical signs and symptoms while it was recorded in 5 days and 7 days after treatment with levofloxacin and moxifloxacin, respectively. On the basis of remission of clinical signs and symptoms (in appetence/anorexia, coughing, nasal discharge and abnormal auscultation findings) and trend towards restoration of normal values of haemato-biochemical parameters, ceftiofur was found to be most effective antimicrobial for the treatment of respiratory disease followed by levofloxacin and moxifloxacin in this study.

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