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RESEARCH ARTICLE

Blood Biochemical Studies of Enrofloxacin in Yak after Intravenous Administration Article Title

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ABSTRACT

The blood biochemical parameters were investigated in yak (Bos grunniens L) after intravenous administration of 5 mg/kg enrofloxacin. Blood samples were collected from the jugular vein daily for 5 days after the initiation of drug administration. Heparinized blood samples were collected for determination of mean corpuscular volume (MCV), erythrocyte sedimentation rate (ESR), hemoglubin (Hb) estimation and serum was collected for estimation of total protein, albumin, globulin, urea and blood glucose. Results of hematological and blood chemistry profile revealed that enrofloxacin did not change above mentioned parameters significantly. Therefore, the drug might be used safely in the yaks.

Keywords: *Enrofloxacin, Yak, Blood chemistry, Hematology*

Enrofloxacin, a fluroquinolone antimicrobial is approved exclusively for veterinary use and has a broad spectrum of antibacterial activity with MIC values ranging from 0.008 to 0.06µg/ml. It has wide spread distribution to most tissues and body fluids with a potential therapeutic application in many types of infections. Hence, it is effectively used in the treatment of septicemia, respiratory tract, urinary tract, skin, soft tissues, bone and joint infections. Yak (Bos grunniens L) , being the most ecologically sustainable animal resource of Indian Himalayas, is the mainstay for highlanders, providing basic needs in terms of meat, milk , hair wool and transportation in hilly terrain. For safety of administration in various animals, biochemical properties of enrofloxacin have been carried out in cattle [1], buffalo [2] and goat [3]. However, availiable data are inadequate to warrant effective clinical use of enrofloxacin in yak. In the light of the above reports, it was decided to study possible biochemical and hematological changes in yak after intravenous administration of enrofloxacin.

MATERIALS AND METHODS

Experimental animals

The study was conducted in six male yaks (Bos grunniens L) reared in the National Research Centre on Yak, Nykmadung Farm , Dirang, Arunachal Pradesh, India. The animals were weighing between 270-330 kg and 2 ½- 3½ years of age. The animals were examined clinically to evaluate health status and to rule out the possibility of any diseases. They were housed in the animal shed with concrete floor and were maintained on green fodder, dry grass and concentrate. Water was provided ad libitum.

Experimental design

The study was conducted in six clinically healthy male yaks. Blood samples (12 ml) were collected by jugular vein puncture just before drug administration (normal/control), 30 minutes after drug administration and on 24 hours intervals for 5 days. 4 ml aliquots of collected blood were transferred to vials containing heparin as anticoagulant in order to estimate haemoglobin, PCV and ESR. Remaining 8ml of blood samples were kept in clean dry wide mouthed tubes in slanting position at room temperature to separate serum for estimation of total serum protein, albumin, globulin, urea, and blood glucose.

Estimation of biochemical and hematological properties:

Standard procedures were followed for quantitative determination of biochemical and hematological properties. Haemoglobin was determined by acid hematin method described by Barker et al in 1965 [4], PCV by micro-haematocrit method as described by Prasad in 1992 [5], and ESR by standard Wintrobe method. Biochemical analyses of samples were performed to measure glucose, total protein, albumin, blood urea nitrogen

Table 1. Mean (n = 5) hematological and biochemical parameters after i.v. administration of enrofloxacin (5mg/kg) in Yak

Day	Hb (g%)	ESR (mm/24 h)	PCV (%)	Protein (g %)	Albumin (g/dl)	Globulin (g/dl)	Glucose (mg/dl)	Urea (mg/dl)
Normal	12.17±0.55[a]	6.97±0.35[a]	46.50±0.64[a]	5.03±0.06[a]	2.69±0.14[a]	2.14±0.09[a]	42.82±1.01[a]	30.24±2.02[a]
1st	12.05±0.45[a]	6.67±0.57[a]	46.37±1.79[a]	5.79±0.39[a]	3.20±0.11[a]	2.59±0.10[a]	124.60±3.01[b]	49.01±2.46[b]
2nd	12.57±0.42[a]	7.08±0.56[a]	43.90±1.49[a]	5.63±0.34[a]	3.15±0.11[a]	2.44±0.09[a]	78.91±1.71[c]	89.04±3.11[c]
3rd	12.03±0.47[a]	6.75±0.50[a]	45.00±1.42[a]	5.17±0.34[a]	2.91±0.14[a]	2.27±0.16[a]	57.97±2.43[b]	60.36±2.99[b]
4th	12.66±0.46[a]	6.25±0.40[a]	46.66±2.13[a]	5.27±0.42[a]	2.87±0.13[a]	2.39±0.14[a]	51.32±2.35[a]	47.39±4.68[a]
5th	13.46±0.40[a]	7.42±0.40[a]	40.71±1.11[a]	5.63±0.38[a]	3.01±0.13[a]	2.62±0.12[a]	45.12±2.02[a]	38.00±3.96[a]

Having same superscripts no significant difference ($p<0.05$)
Having different superscripts significant difference ($p<0.05$)

and globulin as described in literature supplied with the kits. For estimation of blood glucose, albumin, total serum protein and blood urea nitrogen, a UV spectrophotometer (Systronic) was used at wavelength 630, 555 and 480 nm respectively in accordance with provided instructions. Results were calculated according to the formula provided in kit.

Statistical analysis

Analysis of variance was used to detect differences between means for hematological and biochemical parameters. p values < 0.05 were considered to be statistically significant.

RESULTS

The results obtained in the study are presented in the Table 1.

DISCUSSION

Mean (n=5) hematological and biochemical results after intravenous administration of enrofloxacin (5mg/kg) in yak are presented in Table 1. In the present study, it is observed that blood glucose level increases after intravenous injection of enrofloxacin in yak. This might be due to stress which is developed due to repeated puncture of the jugular vein which in turn triggers the release of epinephrine from adrenal medulla, stimulating glycogen breakdown and also inhibits glycogen synthesis in the liver, thus directing all available glucose residue and precursors into the production of free blood glucose [6]. It was observed that blood urea level increased significantly. This was probably due to intravenous administration of enrofloxacin, which inhibits the growth of enteric organisms that synthesize enzyme urease responsible for breakdown of urea to ammonia in the G.I. tract. As a result, urea passes from intestine to blood and elevates the blood urea level [7].

The normal level of Hb, ESR and PCV of adult yak are 12.8 g/dl, 6-10 mm/24 h and 36.0% respectively as reported by Nivasarkar et al., 1998 [8]. In the present study Hb, ESR and PCV values are consistent with the previous report and there was no significance effect on Hb, ESR and PCV values after intravenous administration of enrofloxacin. The mean level of protein, albumin, and globulin in present study did not show significant difference and was consistent with data reported by Nath et al., 2000 [9].

The present study suggests that administration of enrofloxacin intravenously at a rate of 5 mg/kg body weight in yak does not change the hematology and biochemical profile of the animal; hence it is suggested for clinical use.

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