The Pharma Innovation Journal 2017; 6(7): 887-889

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(7): 887-889

www.thepharmajournal.com
Received: 14-05-2017
Accepted: 15-06-2017

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Haematobiochemical changes during medicinal and surgical treatment in clinical goats affected with acute ruminal acidosis

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Abstract
The research was conducted in clinical cases of eighteen goats with acute ruminal acidosis and they were randomly divided into three groups of six animals in each group. Goats were treated with intravenous isotonic sodium bicarbonate, rumen buffer (Bufzone®), probiotics (Ecotas®), fresh rumen fluid and rumenotomy. Blood was collected at 0 hour before and at 12, 24, 72 and 120 hours after initiation treatment for heamatobiochemical studies like heamoglobin, total leucocyte count, total erythrocyte count, packed cell volume, differential leucocyte count, glucose, aspartate amino transferase and alanine amino transferase. In present study heamoglobin, total leucocyte count, total erythrocyte count, packed cell volume, glucose, aspartate amino transferase and alanine amino transferase were increased significantly on the day of case presentation whereas, neutrophils and lymphocytes values had not shown any significant difference. In all the groups heamatobiochemical values were returned to physiological range after treatment. The study has helped in knowing the metabolic status and based these values given precised treatment of goats with acute ruminal acidosis. All the goats recovered without any complications.

Keywords: Heamatobiochemical, goat, acute, ruminal, acidosis

Introduction
In ruminants acidosis is defined as the biochemical and physiological stresses caused by rapid production and absorption of ruminal volatile fatty acids and lactic acid that arise from the over consumption of readily fermentable carbohydrates [3]. The systemic impact of acidosis can have several physiological implications like changes in heamatobiochemical and rumen ecosystem at pH of 5.0 or less [14], hyperkeratosis [7], liver abscesses [8], rumenitis and laminitis [9]. It is very much essential to know the changes in heamatobiochemical parameters as it gives the actual ongoing physiological status of the body in acute ruminal acidosis. Their by decision can be made with respect to line of treatment as per the need of the clinical case. Therefore the present paper reports the haematobiochemical changes in clinical goats affected with acute ruminal acidosis.

Material and Methods
The research was conducted in clinical cases of eighteen goats suffering from acute ruminal acidosis referred for treatment at Department of Veterinary Surgery and Radiology, Veterinary College, Bidar. The animals were randomly divided into three groups of six animals in each group. In group I six goats were received intravenous isotonic sodium bicarbonate and the rumen buffer (Bufzone® from the Intas Pharmaceuticals Ltd., Ahmadabad) 50 g /day per oral for five days. In group II six goats were subjected to rumenotomy and received the intravenous isotonic sodium bicarbonate and probiotics (Ecotas® from the Intas Pharmaceuticals Ltd., Ahmadabad) 1 bolus bid orally for five days. In group III six goats were operated for rumenotomy and received intravenous isotonic sodium bicarbonate and fresh rumen fluid @ 10 ml / kg per orally for two days. Fluid and supportive therapy was given to all the animals for correction of dehydration and fluid loss before and after surgery in ruminal acidotic goats.
The neck of the animal was prepared aseptically for blood collection. Jugular vein was raised from the furrow by pressing with thumb against the neck and punctured with the 5 ml disposable syringe to get 5ml of blood in all animals. Blood was collected (0 hour, before treatment) and after initiation treatment at 12 hours, 24 hours, 72 hours and 120 hours. 2.0 ml

was transferred to the blood collecting tubes containing 10 per cent of ethylene diamine tetra acetate (EDTA) for heamatological studies like heamoglobin, total leucocyte count, total erythrocyte count, packed cell volume and differential leucocyte count. The remaining 3.0 ml was transferred to a clot activator tube for separation of serum and serum was stored at -20 ^{0}C until further use for the estimation of biochemical parameters like glucose, aspartate amino transferase (AST) and alanine amino transferase (ALT). Statistical analysis of data obtained was carried out by employing paired "t" test [16].

Result and Discussion

Haematological Parameters

The details of the all the haematobiochemical values recorded in the present study were given in table 1. Total erythrocyte count, haemoglobin and packed cell volume in present study revealed significant increase on the day of case presentation. This finding was in agreement earlier workers [10, 17]. It could be due to haemoconcentration as a result of dehydration following drawing of systemic fluid in the rumen and profuse diarrhoea [14]. The values of haemoglobin were reached to physiological range at 24 hours after the treatment in Group I, II and III compared to before treatment. These findings were in agreement with earlier reports [10, 17]. In all the three groups the significant increased in the values of packed cell volume was observed at 0 hour before treatment. The PCV values were returned to physiological range at 24 hours after treatment in all the groups [17]. On the contrary PCV dropped to physiological range by 2 hours post surgery in acidotic goats [10]. In all the three groups significant increased TEC values were observed at 0 hour before treatment and reached physiological range 24 hours after treatment and onwards [12, 10]. The changes in haemoglobin, PCV and TEC values after therapeutic intervention could be attributed to inclusion of fluid therapy counteracting the ongoing dehydration.

In the present study total leucocyte count showed significant increased 0 hour before treatment [12, 10]. The elevation of TLC in ruminal acidosis could be due to release of endotoxins in rumen [4]. In group II and III total leucocyte count showed significantly higher value at 24 hours after treatment when compared to group I. The reason for this could be removal of the toxic substances from the rumen and systemic use of antibiotics in controlling the infections. In all the groups total leucocyte count reached to physiological range at 72 hours after treatment [10].

In group I animals, neutrophils and lymphocytes values had not shown significant difference before and after treatment intervals [11]. Whereas, in group II and III animals, neutrophils increased significantly at 12 hours after treatment when compared to before treatment [10]. Significant neutrophilia are similar to the report of earlier workers [1]. In group II and III animals, lymphocytes decreased significantly at 12 hours after treatment when compared to before treatment [10]. Significant lymphopaenia are similar to the report of earlier workers [1]. The values of both neutrophils and lymphocytes were returned to physiological range by 72 hours after treatment [10]. In group II and III reason for changes in values of neutrophils and lymphocytes are due to the stress caused by use of anaesthetic agents and surgery (rumenotomy). There was no significant difference found in the values of monocytes, basophils and eosinophils counts in all the treatment intervals in all the groups [10].

Biochemical Parameters

Increased concentration of glucose (mg / dL) in serum was recorded in all the acute ruminal acidotic goats. This was also observed by erlier authors [6, 17]. Elevated glucose in lactic acidosis has been attributed to hepatic glycogenolysis due to adrenal medulla in response to stress and decreased immune-reactive insulin [5]. In all the groups significant decreased glucose was observed after treatment and reached normal physiological range at 72 hours to 120 hours after treatment. These present results were in close agreement with earlier authors [13, 17]. Comparison between the groups showed significant difference at 24 hours and 72 hours after treatment intervals.

The present study found significant increase in serum AST level at 0 hour before treatment. The rise in AST level in similar way was observed in acidotic goats [6]. In group I, II and III the levels were reached to physiological range at 120 hours after treatment and these observations are in agreement with earlier authors in goats [2]. In all the groups the ALT values were higher 0 hour before treatment and similar results in acidotic goats [15]. The values of ALT reached within the physiological limit at 120 hours after treatment. The reason for rise in AST and ALT could be due to hepatocellular damage as a result of toxic product like alcohol, histamine, thiaminase and other endotoxins produced in the rumen epithelium and thus entering the portal circulation [14].

Table 1: Mean ± SE., values of haematobiochemical in different groups of acute ruminal acidotic goats at before and after initiation of treatment intervals

Sl No	Parameter	Groups	Before Treatment	After Treatment			
			0 hour	12 hours	24 hours	72 hours	120 hours
1	Total erythrocyte count (×10^6/µL)	I	12.21± 0.19	10.81± 0.15**	10.23 ± 0.21**	9.53 ± 0.30**	8.73 ± 0.20**
		II	12.48 ± 0.32	11.15 ± 0.18**	10.13 ± 0.19**	9.26 ± 0.19**	8.65 ± 0.15**
		III	12.81± 0.30	11.35 ± 0.23**	10.68 ± 0.26**	9.55 ± 0.27**	8.66 ± 0.23**
2	Total leucocyte count (×10^3/µL)	I	13.19 ± 0.47	13.20 ± 0.48	12.51 ± 0.43^a	10.98 ± 0.32^a**	10.48 ± 0.28**
		II	13.41 ± 0.26	12.70 ± 0.29	11.21 ± 0.27^b**	10.38 ± 0.21^a**	9.88 ± 0.13**
		III	13.73 ± 0.19	12.73 ± 0.23**	11.15 ± 0.32^b**	10.00 ± 0.14^b**	9.85 ± 0.16**
3	Haemoglobin (g/dL)	I	10.85 ± 0.18	9.91 ± 0.16**	10.36 ± 0.19	10.16 ± 0.20*	9.93 ± 0.13^a**
		II	11.4 ± 0.26	10.58 ± 0.30	10.21 ± 0.23**	9.75 ± 0.14**	9.26 ± 0.13^b**
		III	11.11 ± 0.31	10.00 ± 0.30*	10.13 ± 0.20*	9.53 ± 0.19**	8.96 ± 0.20^b**
4	Packed Cell Volume (%)	I	34.81± 0.83^a	30.63 ± 0.45**	31.00 ± 0.59**	29.48 ± 0.55^a**	26.23 ± 0.42**
		II	36.88 ± 0.90^a	32.33 ± 0.67**	30.96 ± 0.57**	28.28 ± 0.74^a**	26.15 ± 0.38**
		III	38.65 ± 0.64^b	32.73 ± 0.88**	30.55 ± 0.86**	27.86 ± 0.43^b**	25.65 ± 0.56**
5	Neutrophils (%)	I	24.00 ± 0.99	26.66 ± 1.64^a	25.50 ± 1.20^a	23.66 ± 0.55^a	23.83 ± 0.47
		II	24.66 ± 1.11	32.33 ± 0.95^b**	31.16 ± 0.83^b**	27.16 ± 0.60^b	23.33 ± 1.08
		III	23.33 ± 0.98	34.83 ± 1.53^b**	31.66 ± 1.45^b**	26.16 ± 1.13^a	24.16 ± 0.74

6	Lymphocytes (%)	I	69.16 ± 0.60	67.5 ± 1.30[a]	68.00 ± 1.15[a]	69.00 ± 0.81	69.66 ± 0.61
		II	69.00 ± 0.57	60.83 ± 1.35[b]**	62.5 ± 1.60[b]**	67.00 ± 0.96	69.50 ± 0.56
		III	69.16 ± 0.60	58.00 ± 1.78[b]**	61.66 ± 1.81[b]**	67.50 ± 1.17	68.50 ± 1.05
7	Monocytes (%)	I	3.16 ± 0.47	2.33 ± 0.40	2.66 ± 0.36	3.16 ± 0.47	3.16 ± 0.47
		II	2.83 ± 0.30	3.33 ± 0.49	2.66 ± 0.36	2.33 ± 0.29	2.66 ± 0.29
		III	3.33 ± 0.55	2.83 ± 0.47	3.16 ± 0.60	2.66 ± 0.36	3.00 ± 0.51
8	Basophils (%)	I	0.50 ± 0.10	0.33 ± 0.06	0.33 ± 0.06	0.66 ± 0.21	0.16 ± 0.00
		II	0.33 ± 0.01	0.33 ± 0.01	0.50 ± 0.12	0.33 ± 0.01	0.33 ± 0.01
		III	0.33 ± 0.01	0.50 ± 0.02	0.33 ± 0.01	0.50 ± 0.02	0.50 ± 0.02
9	Eosinophils (%)	I	3.50 ± 0.76	3.16 ± 0.65	3.50 ± 0.76	3.50 ± 0.76	3.16 ± 0.70
		II	3.00 ± 0.57	3.16 ± 0.47	3.16 ± 0.47	3.16 ± 0.65	4.16 ± 0.47
		III	3.83 ± 0.60	3.83 ± 0.70	3.66 ± 0.66	2.66 ± 0.61	3.83 ± 0.47
10	Glucose (mg/dL)	I	100.48 ± 2.96	88.10 ± 2.91*	74.51 ± 4.23[a]**	64.55 ± 3.30[a]**	53.58 ± 1.82**
		II	95.64 ± 4.77	81.58 ± 3.29*	61.93 ± 3.22[b]**	53.58 ± 1.82**	48.66 ± 2.35**
		III	94.37 ± 5.74	78.48 ± 3.20*	66.86 ± 3.10[a]**	58.75 ± 2.91[a]**	53.01 ± 1.03**
11	AST (IU/L)	I	104.84 ± 5.15	78.71 ± 1.90**	63.96 ± 1.91**	53.45 ± 2.58**	27.87 ± 2.05**
		II	106.53 ± 7.56	83.60 ± 3.44*	64.53 ± 2.13**	49.50 ± 5.21**	32.72 ± 1.38**
		III	97.73 ± 4.56	77.00 ± 1.99**	59.73 ± 2.00**	42.03 ± 1.15**	27.16 ± 1.30**
12	ALT (IU/L)	I	58.16 ± 2.67	39.83 ± 2.46**	27.83 ± 1.55**	22.5 ± 0.84**	14.83 ± 1.01**
		II	55.16 ± 2.49	38.83 ± 1.92**	31.33 ± 1.47**	24.16 ± 0.87**	18.5 ± 1.70**
		III	58.83 ± 2.27	39.66 ± 1.66**	30.33 ± 1.17**	24.16 ± 1.44**	17.16 ± 1.53**

* Means bearing superscript differ significantly at 5 % level ($P \leq 0.05$) from '0' hr interval within the Group

** Means bearing superscript differ significantly at 1 % level ($P \leq 0.01$) from '0' hr interval within the Group

[a b] Means bearing superscript differ significantly at 5 % level ($P \leq 0.05$) between the groups at corresponding intervals

Conclusion

In the present study total erythrocyte count, total leucocyte count, haemoglobin and packed cell volume were increased significantly on the day of case presentation whereas, neutrophils and lymphocytes values had not shown any significant difference. However, in group II and III, neutrophils and lymphocytes showed marked increase and decrease at 12 hours after treatment as response to surgical and anaesthetic stress. In all the groups increased concentration of glucose, AST and ALT were recorded before treatment and there after values were declined to physiological range. In this study it was observed that 12 to 24 hours was very crucial and most of the heamatobiochemical alterations occur at this period and leads to many complications if the acute acidotic goats are not treated in time. It is most important to know the heamatobiochemical changes in this metabolic condition at 12 to 24 hours post exposure to carbohydrate food and treat with accuracy in acute ruminal acidotic goats to save the life. All the goats recovered without any complications.

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