BIOCHEMICAL STUDIES ON BLOOD METABOLITES IN KETOTIC CROSSBRED COWS FOLLOWING TREATMENT

S. Biswal, D.C. Nayak , G.S. Parida and K. K. Sardar
Department of Pharmacology and Toxicology,
College of Veterinary Sciences, OUAT, Bhubaneswar-751 003,India

ABSTRACT

The blood metabolic test was carried out in six selected dairy herds located inside Bhubaneswar and maintained under similar feeding, housing and managerial practice. Forage provided was mainly paddy straw. 48 cows between 30-120th day of lactation was included in the present study. For normal metabolic profile, 18 crossbred Jersey cows showing ketotic symptoms were selected from the same herd. The plasma glucose level in three groups showed to be significantly ($P < 0.05$) different in group I and highly significant ($P < 0.01$) in group II and III before and 7th day following treatment. A rise in serum Ca and Pi level in all the groups was also recorded but it was not significant.

KEY WORDS:

Ketosis, blood, metabolites, cows

INTRODUCTION

Imbalance rate of input and output of important metabolites results in break down of homoeostasis which in turn causes many diseases at the time of calving and last upto peak lactation (Radostits *et al.,* 2000). Delayed detection and treatment of such conditions may affect adversely the production and causes heavy economic loss (Jorritsma *et al.,* 1998). High productivity of milch cows brings about many metabolic derangements leading to various ailments which are associated directly with animal production. Malnutrition predisposes various metabolic and production diseases in high yielding cows (Rajala-Schultz, 1999; Grohn, 2000). Although, literature is available on different blood biochemical constituents in cows but report on the deviation of these parameters in the ketotic cows following treatment are meager (Geishauser *et al*., 2000; Carrier *et al*., 2004). Hence the present study was undertaken to investigate the trends of blood metabolites in crossbred ketotic cows on seventh day following treatment.

MATERIALS AND METHODS

The metabolic test was carried out in six selected dairy herds located inside Bhubaneswar and maintained under similar feeding, housing and managerial practice. Forage provided was mainly paddy straw. 48 cows between 30-120th day of lactation was included in the present study. For normal metabolic profile, 18 crossbred Jersey cows showing ketotic symptoms were selected from the same herd.

Blood samples (20 ml) from animals under study were collected through right jugular vein puncture by a glass syringe between 8 -10 AM morning and 5 ml was transferred into labelled sterile vials (Varley *et al*., 1980). The remaining 15 ml of blood was kept slanted and then centrifuged at 1500 rpm for 10 min to separate out serum. Collection of blood and separation of plasma/serum for biochemical assay from each herd was completed on the same day. The analytical methods for estimation of plasma glucose and serum calcium, inorganic phosphorus (Pi) (M/s Stangen Imunodiagnostics (P) Ltd.), magnesium and urea (Bauer, 1982) in serum and ketone body (Kronfeld, 1965) were employed.

Some cases were found positive for presence of ketone bodies in the urine. Based on a high intensity of ring formation, 18 cases were selected for detailed investigation and therapeutic trial. They were randomly divided into three treatment groups consisting of 6 animals in each group.

The therapeutic regimens followed in 3 groups were as follows:

Group -I. Dextrose (M/s Baif Laboratories, Wagholi) 20 %, 500 ml daily I/V for 5 days with Ketonex (M/s Alved Pharmaceuticals Ltd., Chennai @ 30 g daily for 7 days.

Table-1: *Concentration of blood constituents in ketotic crossbred cows on 7th day post treatment (Mean±SEM).*

Blood constituents	**Normal cows** (n=48)	**Group -I** (n=6)	
		Before	7th d
Plasma glucose (mM/L)	2.68±0.03	1.90±0.17	2.28±0.
Serum Ca (mM/L)	1.80±0.02	1.75±0.02	1.75±0
Serum Pi (mM/L)	1.17±0.03	1.13±0.01	1.14±0
Serum Mg (mM/L)	1.17±0.02	1.15±0.01	1.15±0
Serum Urea (mM/L)	4.18±0.08	4.13±0.01	4.17±0
Ketone bodies (Serum)	10-30 mg/ dl	> 20 mg/ dl	< 10 m

*Means with superscripts in a row differ significantly (*P < 0.05 and **P < 0.01).*

Group -II. Dextrose (M/s Baif Laboratories, Wagholi) 20 %, 500 ml daily I/V for 5 days with dexamethasone sodium phosphate (M/s Brihans Laboratories,Mumbai) @ 10-20 mg for 5 days.

Group -III. Dextrose (M/s Baif Laboratories, Wagholi) 20 %, 500 ml daily I/V for 5 days with dexamethasone sodium phosphate @ 10-20 mg/kg daily for 5 days along with a single dose of long acting protamine zinc Insulin (M/s Boots Company Ltd., Mumbai) @ 40 units I/M once on first day.

The blood metabolites were estimated in all three groups on 7th day following treatment. The data were subjected to statistical analysis as per Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Concentration of blood biochemical constituents in ketotic crossbred cows on 7th day post-treatment is presented in table 1. A comparison of plasma glucose level in three groups before and 7th day following treatment showed to be significantly ($P < 0.05$) different in group I and highly significant ($P < 0.01$) in group II and III. There was also a rise in serum Ca and Pi level in all the groups but it was not significant. Serum Mg and urea were approximately in the same level prior to treatment.

From the aforesaid observations and clinical findings, it was evident that treatment regimen for group -I and group-III were superior to group -II in respect of change in biochemical parameters and urine test results. These observations in the present study are in accordance with Fox (1971) and Baird (1982). Group-I received dextrose and Ketonex. Dextrose has been recommended as a supplement therapy in bovine ketosis (Fox, 1971; Baird,1982; Hamana *et. al.,* 1986 b) and nicotinic acid (present in Ketonex) has the ability to diminish lipolysis and increase circulating glucose and insulin concentration suggested by Waterman *et al*. (1972).

Dried yeast powder present in Ketonex was also a source of B vitamins necessary for intermediary metabolism of glucose and has been suggested in therapy of bovine ketosis (Kronfeld, 1970). Glucose and glucocorticoid combination has been used successfully in the management of bovine ketosis (Kalita *et al*. 1987, Thakur and Singh, 1987 ; Biswal *et al*., 2006) and the change in serum constituents in the present study are in agreement with the above workers.. This regimen was employed in group II animals with appreciable success in clinical improvement.

In group -III, a combination of glucose, glucocorticoid and a single dose of long acting insulin was given as suggested by Kronfeld (1970), and Valent (1983). The combination of glucose, and glucocorticoid and insulin has the advantage that glucose, and glucocorticoid, prolong hypoglycemia and their antagonistic action in milk production is nullified. Glucocorticoids are directly lipolytic and hence ketogenic. A small dose of long acting insulin counteracts this effect (Kronfeld, 1966). There was comparatively better chemical improvement in group-III than gr -I and gr -II in respect of return of blood glucose and ketone concentration in serum towards normal level and absence of ketone bodies in urine with marked improvement inappetite and milk yield.

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