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Clinico-Biochemical Changes in Experimental Hypocalcaemia in Male Buffalo Calves

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ABSTRACT

Clinical response and biochemical changes induced by intravenous administration of 0.47% Na_2 EDTA were studied in male buffalo calves. The hypocalcaemia was produced within 50 to 65 min. after infusion of 560 to 600 ml of 0.47% Disodium EDTA. The illness lasted for 40 to 55 min. The symptoms included extreme weakness of hind quarters, inability to stand, recumbency, muscular twitching, restlessness leading to comatose stage. Serum calcium fell down from 9.520 ± 0.0254 to 5.820 ± 0.097 mg/dl, and inorganic phosphorus from 6.466 ± 0.304 to 4.124 ± 0.319 mg/dl. Increase in blood glucose level from 60.00 ± 8.367 to 120.00 ± 12.247 mg/dl was also recorded. Serum magnesium level was within normal range.

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INTRODUCTION

Disturbances of calcium homeostasis that produce an abnormally low serum calcium concentration are encountered frequently about the time of parturition in dairy animals and complicated by metabolic factors other than hypocalcaemia (Blood *et al.*, 1989). To have a proper understanding of the pathogenesis of the hypocalcaemia a detailed knowledge of the clinical and biochemical response is most needed. Present study describes the clinico- biochemical response of experimental hypocalcaemia in male buffalo calves.

MATERIAL AND METHODS

Five healthy male buffalo calves of about six to eight months of age and weighing about 80 kg were selected and maintained. As a control study each animal was given a slow intravenous infusion of 500 ml of normal saline solution (0.9%). After this infusion animals were rested for five days.

Hypocalcaemia was induced in each animal by slow intravenous infusion of 0.47% Disodium Ethylene Diamine Tetra Acetate (Na_2 EDTA) until characteristic sign (recumbent - comatose) of hypocalcaemia was observed. The course of disease with clinical signs was

recorded. Blood samples from calves were collected at 0, 1, 2, 4, 6, 8, 10 and 24 hours intervals for biochemical estimations. Serum calcium was estimated as described by Webster (1962). Serum inorganic phosphorus and serum magnesium were estimated as described by Varley (1969). Blood glucose was estimated as per Frankel *et al.* (1970).

RESULTS AND DISCUSSION

Clinical symptoms appeared 50 to 65 minutes of infusion of 560 to 600 ml of 0.47% Na_2 EDTA. Salivation, frequent urination and shallow respiration were observed within 20 minutes of infusion. Uneasyness, restlessness, muscular twitching of shoulder and thigh muscles, paddling movement, dribbling of urine, defecation, laboured breathing, sternal recumbency with a latral kink of the neck and comatosed condition were recorded in all calves within 40 to 50 min. post infusion. Affected calves remained in comatosed condition upto 40 to 55 min. and were able to get up with slight staggering thereafter. They recovered within 8 to 10 hours. Similar observations in induced hypocalcaemia by the same method have been recorded in calves by earlier workers (Ramberg *et al.*, 1967; Pandey and Dwivedi, 1988).

Biochemical changes observed in hypocalcaemia are depicted in figure 1. The mean serum calcium concentration decreased from 9.520 ± 0.254 to 5.820 ± 0.097 mg/dl at two hour and remained so upto four hours ($P < 0.05$). Pandey and Dwivedi (1988) also recorded significant decrease in serum calcium in cow calves at 82 min. post infusion of 5% Na_2 EDTA. In the present study the serum calcium gradually increased to almost pre-experimental values after 8 hours of withdrawal of EDTA infusion. Serum inorganic phosphorus level decreased from 6.466 ± 0.304 to 4.124 ± 0.319 mg/dl. The present results of decrease in serum inorganic phosphorus level are in agreement with the findings of Pandey and Dwvedi (1988). Serum magnesium level was within normal range. Blood glucose level increased from 60.00 ± 8.36% to 120.00 ± 12.24% mg/dl indicating hyperglycaemia during hypocalcaemic stage. Hayashi *et al.* (1979) also observed hyperglycaemia in cows suffering from milk fever. He opined that low level of calcium decreased secretion of insulin and increase in plasma cortisol with free fatty acids and glucose level. Cows with milk fever are in fact diabetes mellitus like condition due to inability to release insulin (Littledike *et al.*, 1969, Blum *et al.*, 1973).

The control calves infused with normal saline solution (0.9%) remained healthy during the study. Their biochemical parameters of various intervals did not show any significant alteration.

In the present study calcium, inorganic phosphorus concentration and clinical symptoms were similar to those of natural cases of milk fever. Further, this study also indicated hyperglycaemic stage during hypocalcaemia. The study showed the utility of calves in place of dairy buffaloes for undertaking basic studies on clinical conditions attributable to hypocalcaemia.

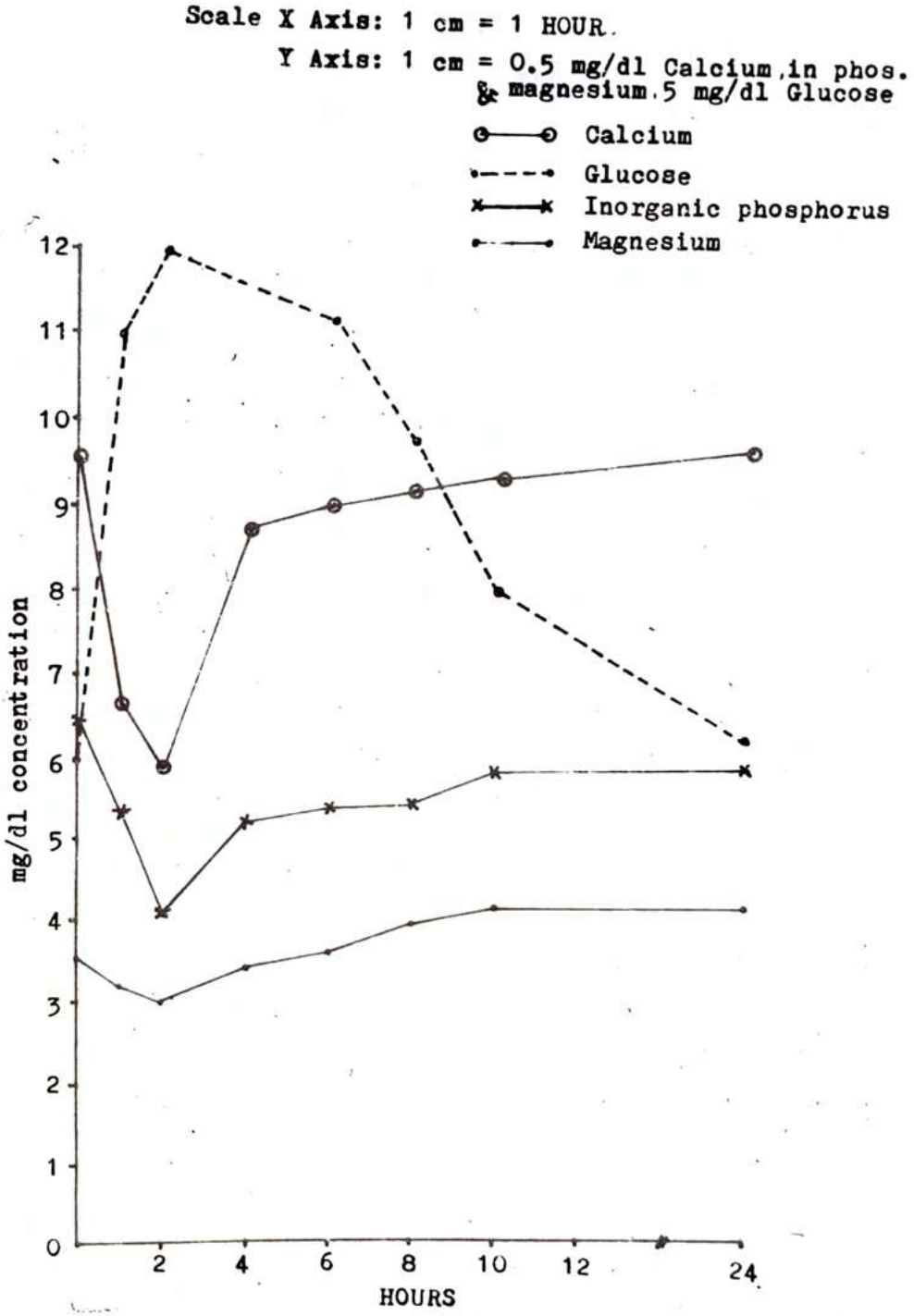


Fig. 1 : Biochemical changes in experimental hypocalcaemia in buffalo calves.

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