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# BIOCHEMICAL AND THERAPEUTIC STUDIES ON POSTPARTURIENT INDIGESTION (PPI) WITH PARTICULAR REFERENCE TO HEPATIC INSUFFICIENCY IN BUFFALOES

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## ABSTRACT

Of 320 buffaloes within 60 days after calving, with the history of reduced feed intake and decreased milk yield presented, 90 (28.13%) buffaloes were found suffering with PPI. On detailed clinical examination and urinalysis, it was observed that 43 (47.78%) buffaloes had hepatic insufficiency. Out of 43 buffaloes of hepatic insufficiency, 23 (25.56 %) had hepatic insufficiency alone. Urine samples were positive for bile pigments. Serum samples were analysed for glucose, calcium, phosphorus, magnesium, total bilirubin, cholesterol, AST, GGT, total protein and albumin and compared with control buffaloes. Buffaloes with hepatic insufficiency were randomly divided in to two different groups. One group (n=11) animals were given Rintose at the rate of 0.5g/ kg b wt iv for one day and inj. Livadex Forte 10 ml im for 3 days. The second group (n=12) animals were given Rintose at the rate of 0.5g/ kg b wt iv for one day and inj. Toxol 10 ml im for 3 days. There was significant improvement in serum glucose, AST, GGT and calcium levels after the treatments and the therapeutic efficacy was found to be same.

## KEYWORDS

Postparturient indigestion, Buffaloes, Biochemical changes, Hepatic Insufficiency, Therapy.

## INTRODUCTION

The postpartum period is the time interval from parturition to subsequent heat[1]. Postpartum diseases adversely affect high yielding dairy animals. Any delay in treatment or improper diagnosis may lead to irreparable losses and milk production may not reach the optimal levels thus leading to economic losses to the farmer[2]. Liver metabolism in late pregnancy and early lactation in dairy cows is under a great deal of stress. Liver dysfunctions or involvement of liver are common in high producing dairy cows soon after parturition as a result of heavy metabolic demands for energy [3]. Ruminant indigestion is invariably associated with functional disturbance of hepatic cells [4].

To attain maximum production, postpartum indigestion needs to be corrected at an early time. The present paper reports the biochemical and therapeutic studies on post parturient indigestion in buffaloes associated with hepatic insufficiency.

## MATERIALS AND METHODS

The present study which lasted for 19 months, 320 cases of buffaloes within two months of calving, without any systemic involvement, with the history of reduced feed intake and decreased milk yield, presented at Ambulatory Clinic, Mylardevpally; Campus Veterinary Hospital, College of Veterinary Science, Rajendranagar and a few periurban dairy farms located in and around Rajendranagar, Hyderabad, were selected, subjected to detailed clinical examination [5] and screened for PPI by conducting urinalysis and physical examination of the rumen.

Urine was collected in all buffaloes while they were voiding it naturally in clean, sterile glass beakers and subjected to Wallace-Diamond test, Ross modified Rothera's test and Sulkowitch test in respect of bile pigments, ketone bodies and calcium respectively [6] Buffaloes which were positive in respect of bile pigments were considered for the present study. They were divided into two groups randomly and two different therapeutic regimens were employed to study their efficacy. Group I (n=11) animals were administered Rintose @ 0.5g/ kg b wt iv for one day and inj. Livadex Forte 10 ml im for 3 days. Group II (n=12) animals were given Rintose @ 0.5g/ kg b wt iv for one day and inj. Toxol 10 ml im for 3 days. Apparently healthy animals within two months of calving formed the control group.

Blood was collected on day 0 and 4 from external jugular vein using 7 ml serum vacutainers under aseptic conditions. After collection, blood was allowed to clot at room temperature and centrifuged for serum separation. Serum samples were transferred into eppendrof tubes and were maintained at 4˚C till they reached the laboratory. Concentrations of glucose, calcium, phosphorous, magnesium, total bilirubin, cholesterol, AST, GGT, total protein and albumin were estimated by using Star 21 plus biochemistry semi auto analyzer supplied by M/s. Rapid Diagnostics Ltd., New Delhi by employing diagnostic kits supplied by M/s. Aspen Diagnostics Ltd., New Delhi. Statistical analysis of the data was carried out by employing paired't' test and ANOVA[7].

## RESULTS AND DISCUSSION

Of 320 buffaloes within 60 days after calving, with the history of reduced feed intake and decreased milk yield presented, 90 (28.13%) buffaloes were found suffering with PPI. On detailed clinical examination and urinalysis, it

was observed that 43 (47.78%) buffaloes had hepatic insufficiency. Out of 43 buffaloes of hepatic insufficiency, 23 (25.56 %) had hepatic insufficiency alone. Urine samples were positive for bile pigments. The mean serum glucose levels in control and group I and II, before and after treatment, were 54.97 ± 1.08, 45.98±0.99 v/s 55.87±0.74 mg/dL and 50.53±2.58 v/s 59.73±0.86 mg/dL, respectively. After therapy, glucose levels increased significantly in group I (P<0.01) and in group II (P<0.05) animals. Similar findings were reported [8and 9]. The low glucose concentrations could be attributed to negative energy balance possibly due to decreased propionate production in rumen, decreased hepatic output and decreased hepatic gluconeogenesis. The mean serum calcium levels in control and group I and II, before and after treatment were 9.03 ± 0.10, 7.85 ± 0.66 v/s 9.13 ± 0.26 mg/dL and 7.45 ± 0.38 v/s 8.16 ± 0.29 mg/dL, respectively. Increased calcium levels were significant (P<0.05) in both the groups. Low serum calcium levels post partum were reported by earlier workers [10 and 11]. The mean serum phosphorous levels in control and group I and II before and after treatment were 5.08 ± 0.15, 4.93 ± 0.19 v/s 5.13 ± 0.13 mg/dL and 4.84 ± 0.15 v/s 5.28 ± 0.11 mg/dL, respectively. Increased phosphorous levels were found significant (P<0.05) in group II. Similar findings were observed[12, 13 and 14]. The decreased serum inorganic phosphorous in PPI animals could be attributed to release in colostrum, milk at the onset of lactation, decreased feed intake and possible compromised hepatic function[15] The mean serum magnesium values in control and group I and II before and after treatment were 2.31 ± 0.04, 2.27 ± 0.09 v/s 2.43 ± 0.12 mg/dL, 2.56 ± 0.14 v/s 2.25 ± 0.06 mg/dL. Decreased magnesium levels were significant (P<0.05) in group II. It could be concluded that magnesium levels have no direct relevance with post partum indigestion.

The mean serum bilirubin values in control and group I and II before and after treatment were 0.32 ± 0.03, 0.49 ± 0.06 v/s 0.43 ± 0.04 mg/dL and 0.05 ± 0.08 v/s 0.32 ± 0.06 mg/dL, respectively. The decreased levels were significant (P<0.05) in group II. Increase in pre treatment values were attributed to improper biliary excretion by the liver which might be due to hepatic cell damage[16]. Increase in levels post partum was recorded in buffaloes[17] and in cows[18] with reduced appetite in early lactation due to hepatic insufficiency. The mean serum cholesterol values in control and group I and II before and after treatment were 111.70 ± 7.50, 112.35 ± 9.59 v/s 108.96 ± 7.76 mg/dL and 140.30 ± 9.46 v/s 134.94 ± 9.75 mg/dL, respectively. Similar findings were reported[19]. Increase in cholesterol levels may probably be due to its decreased uptake by the damaged liver where cholesterol is metabolized to bile acids[20]. The mean serum AST values in control and group I and II before and after treatment were 113.7 ± 4.46, 182.69 ± 15.38 v/s 134.87 ± 9.45 U/L, 152.21 ± 11.90 v/s 110.98 ± 9.93 U/L. Decreased AST levels were significant (P<0.01) in both group I and II. Increased AST levels post partum could be attributed to liver damage as a result of absorption of toxic metabolites from the rumen[21] and persisting damage of hepatic cells and subsequent leakage in the blood[22]. The reason can also be attributed to liver damage or overloading as a result of metabolic changes during parturition and lactation[23]. Similar observations were recorded in buffaloes[24 and 25] and in cows [26 and 27] suffering with PPI. In the present study following treatment, the AST levels decreased which indicated the repair of liver damage. The mean serum GGT values in control and group I and II before and after treatment were 37.13±2.94, 41.48±7.49 v/s 32.61±6.16 U/L and 46.74±3.25 v/s 35.42±3.13 U/L, respectively. Decreased GGT levels were significant (P<0.01) in group II and I (P<0.05). Similar observations were documented[28 and 29] in cows with reduced appetite during early lactation associated with hepatic insufficiency. However, after therapy GGT levels decreased indicating repair of liver damage.

The mean serum total protein values in control and group I and II before and after

treatment were 6.71±0.16, 5.78±0.24 v/s 7.18±0.25 g/dL and 6.19±0.43 v/s 7.00±0.28 g/dL, respectively. Increased total protein levels were significant (P<0.01) in I and II (P<0.05). Decrease in serum total protein could be attributed to liver disorders[30 and 27]. Total protein levels were low in buffaloes suffering with PPI and reached to normal level after therapy. It could be opined with the present study that liver insufficiency results in low protein levels which leads to low calcium and results in rumen dysfunction.

The mean serum albumin values in control and group I and II before and after treatment were 2.68±0.05, 2.29±0.19 v/s 2.60±0.14 g/dL and 2.30±0.09 v/s 2.50±0.07 g/dL, respectively. . Similar decrease in levels was observed[19 and 27] in PPI cases with hepatic insufficiency. Reduced albumin levels are indicative of some biochemical evidence of liver stress[12]. The decrease in levels could be attributed to damage of hepatic cells in buffaloes[31]. After therapy the serum albumin levels reached normal that is indicative of liver repair.

**Table**

***Mean serum parameters of control and animals with hepatic insufficiency***

| S. No. | Parameter | Control | Group I (n=11) | | Group II (n=12) | |
|---|---|---|---|---|---|---|
| | | | Before treatment | After treatment | Before treatment | After treatment |
| 1 | Glucose (mg/dL) | 54.97±1.08 | 45.98±0.99 | 55.87±0.74** | 50.53±2.58 | 59.73±0.86* |
| 2 | Calcium (mg/dL) | 9.03±0.10 | 7.85±0.66 | 9.13±0.26* | 7.45±0.38 | 8.16±0.29* |
| 3 | Phosphorous (mg/dL) | 5.08±0.15 | 4.93±0.19 | 5.13±0.13 | 4.84±0.15 | 5.28±0.11* |
| 4 | Magnesium (mg/dL) | 2.31±0.04 | 2.27±0.09 | 2.43±0.12 | 2.56±0.14 | 2.25±0.06* |
| 5 | Total Bilirubin (mg/dL) | 0.32±0.03 | 0.49±0.06 | 0.43±0.04 | 0.50±0.08 | 0.32±0.06* |
| 6 | Cholesterol (mg/dL) | 111.70±7.50 | 112.35±9.59 | 108.96±7.76 | 140.30±9.46 | 134.94±9.75 |
| 7 | AST (U/L) | 113.7±4.46 | 182.69±15.38 | 134.87±9.45** | 152.21±11.90 | 110.98±9.93** |
| 8 | GGT (U/L) | 37.13±2.94 | 41.48±7.49 | 32.61±6.16* | 46.74±3.25 | 35.42±3.13** |
| 9 | Total Protein (g/dL) | 6.71±0.16 | 5.78±0.24 | 7.18±0.25** | 6.19±0.43 | 7.00±0.28* |
| 10 | Albumin (g/dL) | 2.68±0.05 | 2.29±0.19 | 2.60±0.14 | 2.30±0.09 | 2.50±0.07 |

* ***Significant at P < 0.05*** ** ***Significant at P < 0.01***

## CONCLUSIONS

Buffaloes suffering with indigestion post partum should be screened for liver insufficiency at the field level using Wallace-Diamond test as animal side test and animals that are positive for bile pigments in urine can be diagnosed as PPI due to liver insufficiency and treated accordingly. In the present study, Rintose @ 0.50 g per kg b wt iv for one day and Livadex forte 10 ml im for three days in group I animals, and Rintose @ 0.50 g per kg b wt iv for one day and Toxol 10 ml im for three days was administered in group II animals. There was significant improvement in serum glucose, AST, GGT and calcium levels after the treatments. The comparative means of serum AST and GGT of healthy, group I and group II revealed that efficacy of both the treatments was same.

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