

ASSESSMENT OF HAEMATO - BIOCHEMICAL AND STRESS PARAMETERS DURING THE TRANSITION PERIOD IN BUFFALOES

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ABSTRACT

The present study was designed to record the haematological, serum biochemical changes and stress parameters during the transition period in buffaloes. Ten apparently healthy buffaloes which were in mid-lactation were selected for the study and treated as Group I; twenty apparently healthy buffaloes which were in advance pregnancy were selected for the study and treated as Group II and blood was collected at the time of transition period (i.e. 0 to 6 days of after parturition). Blood samples were collected from the buffaloes for analysis. Buffaloes in the transition period showed the significant changes in haematology by increased levels of packed cell volume, elevation of total leukocyte and lymphocyte count. Serum biochemical changes noticed are reduced levels of total protein, albumin, calcium, phosphorous, glucose levels and increased serum cortisol levels. AST, BUN levels were within the normal range. In conclusion, the study suggests the provision of protein-rich fodder, mineral mixture at the time of parturition along with the supplementation of anti stressor products up to 3 weeks of after parturition.

Keywords: *Bubalus bubalis*, buffaloes, parturition

stress, cortisol, haematology

INTRODUCTION

In bovines, the period before and after 3 weeks of parturition is the transition period and it is the most stressful period. During the time of parturition, physiological processes take place in the neurohormonal system which leads to metabolic and immunological disorders (Ingvarsen *et al.*, 2006). Haematological and serum biochemical changes during the transition period adversely affect the productive and reproductive performance of cows leading to heavy economic losses (Cozzi *et al.*, 2011). Assessment of the blood biochemical profiles is considered important factors for evaluation of health status of animals (Reddy *et al.*, 2014) Studies on the haematological, serum biochemical changes and stress assessment are limited in buffaloes during the transition period (Hagawane *et al.*, 2009).

MATERIALS AND METHODS

The present study was designed to record

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the haematological, serum biochemical changes and stress parameters during the transition period in buffaloes. Ten apparently healthy buffaloes which were in mid-lactation were selected for the study and treated as Group I; twenty apparently healthy buffaloes which were in advance pregnancy were selected for the study and treated as Group II and blood was collected at the time of transition period (i.e. 0 to 6 days of after parturition). Blood samples were collected from the buffaloes for analysis. The blood sample was divided into two parts and the first part (1 ml) was collected on disodium ethylene diamine tetracetic acid (EDTA) for hemogram. The second part (5 ml) was placed in plain centrifuge tubes for separation of serum and serum samples were stored at -20°C until used for subsequent biochemical analysis. Haematological parameters in this study included were an estimation of red blood cell count (RBCs), haemoglobin concentration (Hb), packed cell volume (PCV) and total (TLC) and differential leukocytic counts (DLC). These parameters were done according to the routine haematological procedures as described by Feldman *et al.* (2000). Serum was collected for the estimation of serum total protein, albumin, aspartate aminotransferase (AST), blood urea nitrogen (BUN), serum cortisol levels estimated according to the standard procedures as per the commercially available kits (Sivajothi and Reddy, 2017). Data were presented as the mean \pm standard error (SE) and were subjected to statistical analysis using student t-test by using SPSS version 20.0. Differences at $P > 0.05$ were considered as non-significant, $P < 0.05$ is considered as significant and $P \leq 0.01$ were considered as highly significant at 95% confidence level.

RESULTS AND DISCUSSION

Recorded haematological and serum biochemical changes were mentioned in the Table 1.

Buffaloes under transition period had significantly lowered levels of total erythrocyte count, haemoglobin, packed cell volume levels than the Group I. These findings were in association with the previous authors (Sateesh *et al.*, 2018) and recorded lower haematocrit values in the transition period had been attributed to diminished immunological status thereby suppression of erythropoiesis from bone marrow (Detilleux *et al.*, 2004). Mean total leucocyte count was significantly lowered in buffaloes during the transition period than the Group I. Present findings in association with the previous literature in cows. The lowered leucocyte count might be due to increased levels of glucocorticoids caused by the immune suppression during the transition period (Khadjeh *et al.*, 2002). Recorded abnormal differential leucocyte count indicative of stress during the time of parturition. This change was previously reported and may result from the cortisol mediated stress.

The mean serum calcium, phosphorous and glucose levels during the time of transition period were significantly lower compared to healthy control group. It might be due to the drain of calcium in the colostrums, decreased numbers of receptors for 1, 25-dihydroxyvitamin D in the intestine and impaired absorption of calcium (Goff, 2004). Reduced levels of phosphorus due to the utilization of phosphorus at this stage with enhanced carbohydrate metabolism and utilized for the foetal growth (Seifi *et al.*, 2007). Recorded hypoglycaemia is due to the several hormonal changes at the time of parturition. But in few animals chances of development of the

Table 1. Haematological and serum biochemical changes in buffaloes during the transition period (Mean±S.E.).

S.No	Parameters	Apparently healthy buffaloes(n=10)	Buffaloes during transition period (n=20)	P-value
1	Haemoglobin (g/dl)	11.27±0.13	9.39±0.18	0.001**
2	PCV (%)	36.50±1.1	32.31±1.90	0.001**
3	TEC x10 ⁶ /cumm	7.45±0.09	6.26±0.83	0.001**
4	TLC /cumm	8378.0±236.1	6904.4±118.6	0.001**
5	Neutrophils /cumm	2555.6±101.22	2242.5±81.04	0.069 ^{NS}
6	Lymphocytes /cumm	5227.87±201.21	4269.4±107.8	0.001**
7	Monocytes /cumm	293.3±19.3	127.4±32.13	0.001**
8	Eosinophils /cumm	192.70±9.16	207.8±11.18	0.208 ^{NS}
9	Basophil /cumm	67.60±9.22	22.12±8.02	0.071 ^{NS}
10	Cortisol (nmol/L)	18.91±0.71	42.46±1.43	0.001**
11	Total protein (g/dL)	6.98±1.96	6.18±1.01	0.024*
12	Serum albumin (g/dL)	3.46±0.77	3.12±1.01	0.028*
13	AST (IU/L)	56.34±5.45	54.98±6.17	0.280 ^{NS}
14	BUN (mg/dL)	28.42±4.19	29.02±3.92	0.318 ^{NS}
15	Calcium (mg/dL)	9.98±0.99	7.69±0.62	0.001**
16	Phosphorous (mg/dL)	5.02±0.42	3.71±0.82	0.001**
17	Glucose (mg/dL)	63.09±6.12	52.90±9.27	0.001**

NS: Not Significant (P>0.05); *: Significant (P≤0.05); **: Highly Significant (P≤0.01)

gluconeogenic effect of epinephrine and cortisol due to parturition stress (Yokus and Cakir, 2006).

Reduced levels of mean total protein, albumin levels was noticed in buffaloes under Group II with the buffaloes Group I. It might be due to the utilization of the protein for the fetal growth, formation of colostrum and hepatic lipidosis and stress immediately after calving (Cunningham, 2002). There is no significant difference in the levels of blood urea nitrogen and AST levels in between the Group I and Group II. Recorded higher levels of serum cortisol levels suggestive of stress markers and which an indication of the buffaloes had parturition stress (Dettelleux *et al.*, 2004; Sivajothi *et al.*, 2018).

In conclusion, buffaloes during the transition period showed the reduced levels of serum protein, albumin, calcium, phosphorous, glucose indicative of supplementation of above after parturition. They showed the stress haematology and increased levels of cortisol indicative of parturition stress in buffaloes.

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