Haryana Vet. (April, 2019) 58 (S.I.), 84-86

Research Article

BIOCHEMICAL CHANGES IN GRADED MURRAH BUFFALOES AFFECTED WITH MATERNAL AND FETAL DYSTOCIA

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Received : 01.03.2019; Accepted : 12.03.2019

ABSTRACT

Maternal and fetal dystocia causes huge economic losses to the buffalo farmers due to calf mortality and postpartum complications of the dam. The present work was undertaken to study the biochemical changes following maternal and fetal dystocia in Graded Murrah buffaloes that were brought to the large animal obstetrical unit, NTR CVSc, Gannavaram, AP, India. A total number of 35 clinical cases of Graded Murrah buffaloes suffering from maternal dystocia (comprising uterine torsion, n=25) and fetal dystocia (n=10) were included in this study during a period from September 2017 to August 2018. Blood samples were collected from 35 buffaloes suffering from maternal dystocia and fetal dystocia, while 8 normally calved buffaloes served as control group. Certain clinically important biochemical parameters were estimated and compared. The present study revealed that calcium and phosphorus were signigicantly lower in dystocia groups comapred to eutocia group. BUN was singificantly elevated in maternal dystocia group, creatinine was singificantly elevated in fetal dystocia group while AST was singificantly elevated in both maternal and fetal dystocia groups comapared to eutocia group. It was concluded from the present findings that the liver and kidney functions were adversely affected with increase in duration of dystocia.

Key words: Biochemical parameters, Buffaloes, Dystocia, Parturition, Prognosis

Bovines are commonly affected with dystocia during parturition (Ghuman, 2010). Various forms of fetal and maternal dystocia especially uterine torsion has been reported as a serious cause of dystocia in cattle (Aubry *et al.,* 2008) and buffaloes (Amin *et al.,* 2011) which is fatal to both fetus and the dam. Factors such as duration of straining, previous attempts in correction and severity of the condition either due to fetal or maternal causes influence the outcome of the condition (Amin *et al.,* 2011). When physical methods of examination fail to suggest the condition of the animal, biochemical parameters may be used to determine the condition of the animal before and after the correction of dystocia (Ghoneim *et al*., 2016). The dynamic changes in biochemical parameters are suggestive of deteriorating condition of the dam and thus facilitate to decide and choose post-operative therapies, like electrolyte therapy, anti-stress and hepato-protectant therapy(Ghoneim *et al*., 2016). Perusal of literature revealed that no systematic studies were carried out on Graded Murrah buffaloes on biochemical status in relationship to maternal and fetal dystocia with their clinical significance during handling cases of dystocia which are presented with various severities. Hence, the present work was conducted to find a relationship between maternal and fetal dystocia with regards to serum biochemical changes.

MATERIALS AND METHODS

A total number of 35 clinical cases of Graded Murrah buffaloes suffering from maternal dystocia (comprising uterine torsion, n=25) and fetal dystocia (n=10) were included in this study during a period from September 2017 to August 2018; which were referred to large animal Obstetrical unit, NTR College of Veterinary Science, Gannavaram. Detailed obstetrical examination was done to assess the cause of fetal dystocia, while both per vaginal and per rectal examinations were done to assess the side, site and degree of uterine torsion.

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Blood samples were collected from 35 buffaloes suffering from maternal dystocia and fetal dystocia via jugular venipuncture in clot activator tubes. Also blood samples were collected from 8 normally calved buffaloes and used as a control group.Serum was separated from clot activator vial containing blood by centrifuging the sample at 3000 rpm for 10 minutes and stored at -20°C until estimation of biochemical parameters. Blood from normally calved buffaloes were collected within 1 hour of parturition (0 hrs) and 24 hours after calving. While, from maternal and fetal dystocia affected buffaloes samples were collected just before handling of dystocia (0 hrs) and 24 hours after manual delivery. Biochemical parameters such as glucose, calcium, phosphorus, blood urea nitrogen (BUN), creatinine, aspartate aminotransferase (AST) were analysed by calorimetric method. Statistical analysis was done as per the procedures described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Changes in levels of biochemical parameters in blood and serum are shown in Table 1. The mean serum glucose concentration was non-significantly ($P<0.05$) increased in all groups of buffaloes at both 0 hrs and 24 hrs and between 0 hrs and 24 hrs. The present findings were similar to those of Prabhakar *et al.* (2002) who also recorded no significant changes in serum glucose concentrations between dystocia affected buffaloes and eutocia buffaloes. Increased level of glucose concentration in the present study might be due to production of cortisol that culminated to hyperglycaemia via the gluconeogenesis pathway (Dhindsa *et al.* 2005). Further, the variation in the glucose levels in the present study might be due to the intravenous administration of Dextrose saline used for treatment of animals suffering from anorexia and other forms of illness in veterinary practice.

The present investigation recorded that the mean serum calcium concentrations was significantly ($P<0.05$) decreased in maternal and fetal dystocia as compared to eutocia buffaloes at both 0 hrs and 24 hrs. The present study

Table 1:

Biochemical parameters (mean±SE) in different groups of Graded Murrah Buffaloes at 0 hrs and 24 hrs

S.No	Biochemical parameters	Status of calving	Before handling (0 hrs)	After handling (24 hrs)
1	Glucose (mg/dl)	Maternal dystocia	107.44±2.42**	101.76±2.11
		Fetal dystocia	106.10±2.77**	99.20±2.10
		Eutocia	103.75±3.98*	95.50±2.69
2	Calcium (mg/dl)	Maternal dystocia	7.38±0.29**	8.48±0.06
		Fetal dystocia	7.50±0.12**	8.72±0.11
		Eutocia	9.19±0.10*	9.36±0.78
3	Phosphorus (mg/dl)	Maternal dystocia	4.60±0.10	4.49±0.06
		Fetal dystocia	4.27±0.04*	4.46±0.07
		Eutocia	5.50±0.08**	5.65±0.06
4	Plasma Total Protein (mg/ml)	Maternal dystocia	3.36±0.12	3.06±0.19
		Fetal dystocia	3.07±0.25**	2.32±0.31
		Eutocia	3.04±0.42	2.73±0.63
4	Blood Urea Nitrogen (mg/dl)	Maternal dystocia	35.00±0.63**	27.02±0.59
		Fetal dystocia	19.30±0.77**	17.12±0.28
		Eutocia	19.05±0.61**	14.69±0.79
5	Creatinine (mg/dl)	Maternal dystocia	1.41±0.04	1.68±0.25
		Fetal dystocia	1.88±0.03**	1.79±0.02
		Eutocia	1.32±0.10**	1.21±0.09
6	Aspartate aminotransferase (IU/l)	Maternal dystocia	85.56±0.85	79.14±3.81
		Fetal dystocia	76.20±6.28	68.22±1.52
		Eutocia	49.23±1.72**	36.89±2.58

Group with superscripts (*) in a row differed significantly (P<0.05)

Group with superscripts (**) in a row differed highly significantly (P<0.01)

recorded significant increase in Ca level in all groups of buffaloes at 24 hrs compared to 0 hrs. The observations of the present study were correlated with those of Benzaquen *et al*. (2015) and Silva *et al*. (2015) who also recorded lower values of serum calcium concentration in dystocia affected animals.. On the converse, reports of Ghoneim *et al*. (2016) suggested no significant variations in the serum calcium concentrations of dystocia affected and eutocia buffaloes. The lower serum calcium concentration in the present study might be due to deficiency of calcium during late gestation period or due to the excessive contractions of the abdominal muscles associated with vigorous straining in uterine torsion and fetal dystocia (Ghuman, 2010).

The mean phosphorus concentration was significantly (P<0.05) lower in dystocia affected buffaloes as compared to eutocia buffaloes at both 0 hrs and 24 hrs, while non-significant variation was observed between maternal dystocia and fetal dystocia. The findings of the present study were in agreement with those of Ali *et al.* (2011) and Abd Ellah *et al*. (2014) who recorded lower values of serum phosphorus concentration in dystocia affected animals. On the contrary, Ali *et al*. (2016) suggested no significant variations in the mean phosphorus concentrations of dystocia affected and eutocia buffaloes. The significant decrease in phosphorus levels of dystocia affected buffaloes might be due to the more requirements of ATP molecules for excessive energy production needed for excessive muscle contraction as phosphorus was needed for conversion of ADP molecules to ATP molecules (Mayes and Botham, 2003).

The mean BUN concentrations were significantly (P<0.05) higher in maternal dystocia as compared to fetal dystocia and eutocia buffaloes, but no significant difference was observed between fetal dystocia and eutocia groups. The observations of the present study were in agreement with previous reports of Amer *et al.* (2008), Ali *et al*. (2011), Jeengar *et al*. (2015) and Ali *et al*. (2016) who also observed increased mean BUN concentration in maternal dystocia buffaloes. On the contrary, few studies showed disagreement with the present findings where the mean serum BUN concentrations were significantly higher in both fetal and uterine torsion affected buffaloes as compared to eutocia buffaloes (Prabhakaran *et al.* 2006). The mean serum BUN concentrations of maternal and fetal dystocia affected buffaloes decreased after 24 hrs of fetal delivery (Jeenger *et al.*, 2015 and Tripathi and Mehta, 2016). The increased serum BUN concentrations in uterine torsion affected buffaloes might be attributed to excessive muscle contractions combined with retention of urine for prolonged periods until detorsion (Ghuman, 2010).

The mean creatinine concentrations were significantly (P<0.05) higher in fetal dystocia as compared to maternal dystocia and eutocia buffaloes, but no significant difference was observed between maternal dystocia and eutocia buffaloes. The results of the present investigation were similar to those of Ali *et al.* (2011) who also recorded no significant variations in mean serum creatinine levels between maternal dystocia and eutocia buffaloes. The present study revealed no significant decrease in the mean serum creatinine concentrations of maternal dystocia affected buffaloes at 24 hrs after fetal delivery, while the mean creatinine concentrations decreased significantly (P<0.01) in fetal dystocia affected buffaloes at 24 hrs after handling. The present study was in

contrary with recent studies of Singh *et al*. (2009) who revealed that the mean serum creatinine concentrations decreased following obstetrical operation in maternal dystocia affected buffaloes. Previous studies by Amer and Hashem (2008) and Ghuman (2010) have opined that the prognosis was poor when the BUN and creatinine concentrations were high at the time of presentation and before the treatment of dystocia and the same findings could be implied to the present study.

The present investigation recorded that the mean serum AST concentration was significantly ($P<0.05$) higher in maternal and fetal dystocia when compared to eutocia buffaloes at both 0 hrs and 24 hrs, while no significant difference was observed between maternal and fetal dystocia at both 0 hrs and 24 hrs. Moreover significant decrease in mean serum AST concentration in fetal dystocia buffaloes after 24 hrs of calving was also recorded. The present findings were agreement with recent studies of Abd Ellah *et al*. (2014), Tripathi and Mehta (2016) who also revealed higher mean serum AST concentration in uterine torsion and fetal dystocia affected buffaloes as compared to eutocia animals. Further, it was observed that the mean serum AST concentration was higher in maternal dystocia affected buffaloes as compared to fetal dystocia affected buffaloes, which was in agreement with the previous studies of Hussein and Abd Ellah (2008) and Amin *et al*. (2011) who also reported enhanced blood serum AST activities during maternal and fetal dystocia, especially in maternal dystocia. Significantly increased serum AST activities in the present study might be due to muscle exhaustion, presence of a dead fetus with delayed presentation, necrosis or damage of uterine cells during excessive straining, disruption of liver metabolism due to circulatory endotoxins in delayed cases of uterine torsion (Amin *et al*., 2011 and Ali *et al*., 2016).

In conclusion maternal and fetal dystocia can cause serious outcome in buffaloes. It seems that dystocia adversely affected the liver and kidney functions. The dynamic changes in biochemical parameters such as serum calcium, phosphorus, BUN, creatinine and AST concentrationscould be used as prognostic indicators of obstetrical operations in maternal and fetal dystocia affected buffaloes.

ACKNOWLEDGEMENTS

The authors are thankful to ICAR for Junior Research Fellowship and the Head, Department of Veterinary Gynaecology and Obstetrics, NTR CVSc, Gannavaram for providing necessary facilities.

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