

Changes in plasma enzyme levels following fetotomy and caesarean operation in buffaloes affected with dystocia

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ABSTRACT

The enzymatic activity in twenty-six dystocia-affected buffaloes was studied. Out of 26, 10 buffaloes were treated through fetotomy and 16 buffaloes were subjected to caesarean section. The enzyme levels of six normally calved buffaloes were taken as control. Plasma LDH, ALT and ACP activity were elevated non-significantly, however, plasma AST levels were significantly higher in dystocia affected buffaloes as compared to normally calved control. Plasma AKP levels were considerably low in dystocia group as compared to control. Plasma LDH, AKP and ACP activity were comparatively higher in caesarean conducted buffaloes as compared to fetotomy group, whereas plasma AST and ALT activity was higher in fetotomy groups than the caesarean operation. The activity of LDH, AST, ALT and ACP remained elevated on post-treatment days in both dystocia affected groups indicating stress of surgery and tissue damage with possible necrosis of uterine musculature.

Key Words: Buffalo, caesarean, dystocia, enzymes, fetotomy

Stress caused by dystocia plays an important role in pathophysiology of puerperium (Nakao and Grunert, 1989). Severe distress and trauma is caused by obstetrical techniques like fetotomy and caesarean section employed to deliver the fetus (Hayer *et al.*, 1990). Plasma enzyme levels are considered of real prognostic value and are good indicators of tissue damage. The evaluation of plasma enzyme levels in buffaloes during dystocia and after its manipulation through fetotomy and caesarean section was investigated in the present study.

MATERIALS AND METHODS

Twenty-six buffaloes which required fetotomy (n = 10) and caesarean section (n = 16) for relieving dystocia were included in the present study. Ten buffaloes having dystocia due to fetal monstrosities or malpresentations were subjected to partial or complete fetotomy under epidural anaesthesia. Sixteen buffaloes suffering from dystocia due to contracted cervix, irreducible uterine torsion and narrow birth canal were

subjected to caesarean section. Caesarean was carried out in right lateral recumbency under local anaesthesia.

Blood samples were collected through jugular venipuncture before the start of any obstetrical manoeuvre and once daily thereafter, on three post-treatment days. Blood samples were also collected from six normally calved buffaloes through jugular venipuncture daily starting from day of calving until three days after calving. Plasma was harvested and stored at - 20°C till analysed. Plasma lactate dehydrogenase (LDH), aspartate and alanine aminotransferase (AST and ALT) and acid and alkaline phosphatase (ACP and AKP) were estimated by the method of Wootton (1964). Data was tested for statistical significance by student's t-test at 5 and 1 per cent level of significance (Gupta, 1986).

RESULTS AND DISCUSSION

Plasma Lactate Dehydrogenase (LDH): Plasma LDH levels in dystocia affected buffaloes were elevated as compared to normally calved (Table 1). Upto day 2 post-treatment, LDH levels declined gradually in fetotomy operated as compared to caesarean operated buffaloes. In later group, the levels remained higher till day 2 after surgery. Gradually decline in LDH activity following

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Table 1. Plasma enzyme levels (Units/L) in control and obstetrical cases in buffaloes

Plasma enzyme	Group	Calving/at presentation	Days post partum/post-treatment		
			1	2	3
LDH	Control (6)	380.75±12.25	384.23±8.77	377.71±13.37	392.16±8.05
	Fetotomy (10)	382.35±12.44	370.01±21.48	347.69±11.32	401.17±14.30
	Caesarean (16)	396.50±10.27*	410.97±16.48	404.03±17.88	16.25±1.48
AST	Control (6)	17.90±1.63	18.96±1.18	18.75±1.72	16.25±1.48
	Fetotomy (10)	20.76±1.84**	25.45±3.81	26.89±3.61	390.90±4.56*
	Caesarean (16)	24.32±2.99**	24.92±2.97	25.62±2.63	27.85±6.45
ALT	Control (6)	12.49±1.72	10.83±1.35	10.39±2.16	8.69±2.16
	Fetotomy (10)	15.07±3.24	20.45±3.66*	28.80±6.38*	20.78±5.50
	Caesarean (16)	15.57±2.57	16.23±4.47	18.84±1.81	16.59±1.46
AKP	Control (6)	22.15±3.90	21.30±3.62	23.00±4.06	25.13±3.74
	Fetotomy (10)	15.21±3.75	9.57±3.37	11.27±4.14	8.02±2.01
	Caesarean (16)	19.70±3.05	18.20±3.62	18.62±3.12	18.68±3.40
ACP	Control (6)	0.67±0.07	0.83±0.12	0.81±0.12	—
	Fetotomy (10)	0.69±0.19	0.79±0.21	0.84±0.29	—
	Caesarean (16)	1.07±0.42	1.05±0.31	2.10±1.28	—

* $P < 0.05$; ** $P < 0.01$ Significantly different from corresponding values in normally calved buffaloes.

fetotomy may indicate removal of stress and initiation of healing. However, elevated LDH levels after caesarean in buffaloes hinted at extensive tissue trauma and necrosis post-surgery which may be responsible for increasing cell permeability and leakage of LDH enzyme in blood circulation. Increased LDH levels following dystocia in cattle (Sharma *et al.*, 1991) and following caesarean section in buffaloes (Phogat *et al.*, 1991) have been reported.

Plasma Aspartate and Alanine Aminotransferase (AST and ALT) : As compared to normally calved controls, AST and ALT levels in dystocia affected buffaloes were significantly ($P < 0.01$) and non-significantly ($P < 0.05$) higher, respectively. In fetotomy or caesarean operated buffaloes, plasma AST levels remained elevated till day 3 post-treatment. Significantly higher ($P < 0.05$) plasma ALT levels in days 1 and 2 post-fetotomy were observed as compared to normally calved buffaloes. Decline in plasma ALT levels was observed in fetotomy or caesarean group on days 3 post-treatment, however the level remained elevated as compared to initial levels. Higher levels of AST and ALT in dystocia affected buffaloes, which increased further after fetotomy or caesarean operation may be due to laceration, necrosis of vaginal/uterine muscles or injury to abdominal muscles while performing surgery. Rise in AST and ALT levels has been reported due to skeletal muscle damage and muscular dystrophy (Wilson *et al.*, 1972). Excessive release of catecholamines due to stress of dystocia and increased utilization of carbohydrate reserves and proteins may increase AST and ALT levels (Kumar, 1993) in dystocia affected buffaloes. The decline in ALT levels in day 3 post-treatment may be related to decrease in stress due to fetotomy or caesarean operation. Animals with abdominal parturition (Sharma *et al.*, 1991) and uterine torsion (Phogat *et al.*, 1991) have been reported with higher AST and ALT levels.

Plasma Alkaline and Acid Phosphatase (AKP and ACP) : Buffaloes affected with dystocia had appreciably lower levels of plasma AKP as compared to normally calved buffaloes throughout the period of study. In fetotomy operated buffaloes, during post-treatment, the AKP level declined to significantly lower ($P < 0.01$) levels on day 3 as compared to normally calved buffaloes. Marginal decline in AKP levels was noticed on day 1 after caesarean operation, thereafter, no apparent change was noticed. Plasma ACP levels were marginally higher

in dystocia affected buffaloes as compared to normally calved controls. During the post-treatment period, non-significantly rise in plasma ACP levels particularly in caesarean operated buffaloes was noticed. Phogat *et al.* (1991) reported higher AKP and ACP levels in buffaloes affected with uterine torsion which were subjected to caesarean section. Damaged uterine musculature coupled with tissue necrosis might have led to such an increase after surgery. In the present study, the reason for non-significantly lower AKP levels as compared to controls, which decreased further on post-treatment days, remained unexplained.

It can thus be concluded that plasma LDH, AST, ALT and ACP levels were higher in dystocia affected buffaloes as compared to normally calved controls. The various enzyme levels remained elevated after fetotomy or caesarean operation, which may indicate muscular damage and persistent stressful condition.

REFERENCES

- Gupta. S.P. (1986). Statistical Methods. 21st revised edn. Sultan Chand and Sons. New Delhi, India.
- Hayer, C., Grunert, E. and Jochle, W. (1990). Plasma glucocorticoid concentration in calves in an indicator of stress during parturition. *American J. Vet. Res.*, **51**: 1882-1885.
- Kumar. P. (1993). Post-partume ovarian activity in relation to calving season in buffaloes. M.V.Sc. thesis. Punjab Agricultural University, Ludhiana, India.
- Nakao. T. and Grunert, E. (1989). Post-partum adreno-cortical function in dairy cows with dystocia submitted to caesarean section. *Theriogenology*, **32**: 205-209.
- Phogat, J.B., Bugalia, N.S., Verma, S.K. and Singh, I. (1991). Biochemical and haematological variations associated with uterine torsion and following caesarean section in buffaloes (*Bubalus bubalis*). *Proceedings 11th International Congress on Animal Reproduction and Artificial Insemination*. Dublin, Ireland. **3**: 212-214.
- Sharma R.P., Bishnoi. B.L., Bhatia, J.S., Kohli. I.S. and Gupta. A.K. (1991). Studies on serum enzyme, inorganic constituents and haemoglobin in parturient complications in cattle. *Indian J. Anim. Reprod.*, **12**: 36-93.
- Wilson. G.D.A., Harvey, D.G. and Smook. C.R. (1972). A review of factors affecting blood biochemistry in the pig. *British Vet. J.*, **128**: 596-601.
- Wootton, I.D.P. (1964). *Microanalysis in Medical Chemistry*. 4th edn. J. and A Churchill Ltd., London.

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