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Haemato-biochemical profile in graded murrah buffaloes with fetal dystocia and eutocia

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Abstract

Haemato-biochemical parameters were compared between fetal dystocia affected and eutocia buffaloes. Group I comprised of six eutocia buffaloes, while Group II comprised of six buffaloes affected by fetal dystocia. Results revealed that total leukocyte count, neutrophils and monocytes were significantly ($p < 0.05$) higher in fetal-dystocia affected buffaloes compared with eutocia. The lymphocyte count was significantly ($p < 0.05$) lower in fetal dystocia-affected buffaloes when compared with normally calved buffaloes. Non-significant variation was recorded for eosinophils and blood urea nitrogen concentration in between the buffaloes with fetal dystocia and eutocia. Significantly ($p < 0.01$) higher creatinine was observed in fetal dystocia affected than normally calved buffaloes. In conclusion, evaluation of haemato-biochemical parameters may be helpful to improve the health of buffaloes affected with dystocia and increase the survivability of their calves.

Keywords: Fetal dystocia, eutocia, buffalo, haemato-biochemical parameters

1. Introduction

Fetal dystocia is characterized as defects in the orientation of the fetus or fetopelvic disproportion (Noakes *et al.*, 2019) [14]. It is a leading cause for major losses among cattle and buffalo due to large number of abortions cases occurring routinely. In buffalo, the prevalence of dystocia ranges from 2-23% (Mee, 2008) [13]. The most common cause of fetal dystocia is fetal maldisposition (Noakes *et al.*, 2019) [14]. Although parturition is a physiological process, it is stressful for both the dam and fetus, while dystocia intensifies the stress, which results in haemato-biochemical alterations (Wani *et al.*, 2018) [24]. Variations in haematology were evident because of stress which is due to increased glucocorticoid secretion (Tiwari *et al.*, 2020) [22]. Biochemical changes were evident due to increased free radical generation because of stress (Sathya *et al.*, 2010) [17]. As a result, assessing the changes in haematology and metabolic profile during eutocia and dystocia is essential, as it provides diagnostic and prognostic information. Keeping these points in view the present study was designed to assess the changes in haemato-biochemical parameters in fetal-dystocia affected buffaloes compared with normally calved buffaloes.

2. Materials and Methods

The current work was carried out on Graded Murrah buffaloes affected with fetal dystocia, which were presented to the Large Animal Obstetrical ward, Department of Veterinary Gynaecology and Obstetrics, NTR CVSc, Gannavaram, Andhra Pradesh during the research period from January 2022 to December 2022. Blood collected in EDTA vacutainers for the estimation of haematological parameters and blood collected in clot activator vacutainers were used to harvest serum needed for estimation of biochemical parameters. Blood samples were collected from buffaloes affected with fetal dystocia and from normally-calved buffaloes, which served as controls. Total leukocyte count (TLC) and Differential leukocyte count (DLC) were estimated immediately after blood collection as per the standard procedure described by Jain (1993) [10]. By using semi auto analyzer (Multiskan go, Thermo Scientific Instruments).

Biochemical parameters (Blood urea nitrogen and Creatinine) were estimated with the help of commercially available biochemical kits. Statistical analysis of the data was done as per the procedures described by Snedecor and Cochran (1994) [19].

3. Results and Discussion

3.1 Haematological parameters

Haematological traits like total leucocyte count, neutrophils, lymphocyte, monocyte and eosinophil counts are influenced under stress conditions which is due to increased cortisol secretion (Dukes, 2013) [8]. The results for haematological parameters in fetal dystocia affected and normally calved buffaloes are presented in Table 1.

Table 1: Haematological parameters (Mean \pm SE) in fetal dystocia and eutocia buffaloes

S. No	Haematological parameters	Group I (Eutocia)	Group II (Fetal dystocia)
1	Total leucocyte count ($10^3/\mu\text{L}$)	9.72 \pm 0.11	10.17 \pm 0.12*
2	Differential leucocyte count (DLC)		
A	Neutrophils (%)	52.00 \pm 1.61	56.83 \pm 0.74*
B	Lymphocytes (%)	46.66 \pm 0.91	41.33 \pm 1.76*
C	Monocytes (%)	0.79 \pm 0.35	1.39 \pm 0.10*
D	Eosinophils (%)	0.55 \pm 0.20	0.45 \pm 0.16

Mean with different superscripts (*) in a row differed significantly ($p < 0.05$)

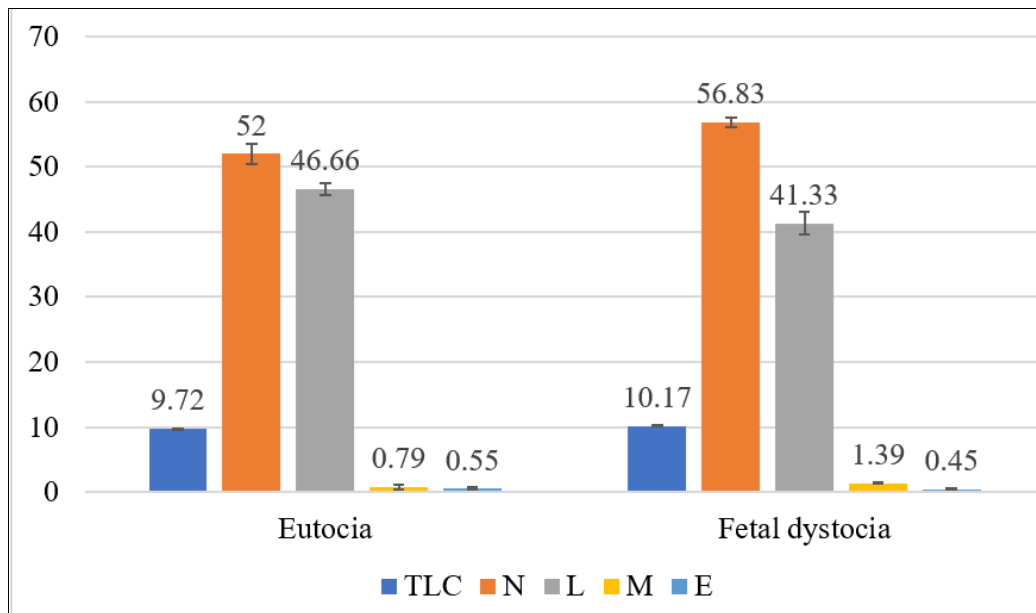


Fig 1: Haematological changes in eutocia and fetal dystocia buffaloes

In the present study, significantly ($p < 0.05$) elevated mean TLC count was observed in fetal dystocia-affected buffaloes compared to normally calved buffaloes. The findings in the present study were in accordance with the previous reports of Prabhakaran *et al.* (2006) [16], Khan (2012) [12], Arvind Kumar (2018) [5], Wani *et al.* (2018) [24] and Thangamani *et al.* (2019) [20] who also recorded significantly elevated TLC count in fetal dystocia affected buffaloes than normally calved buffaloes. On the contrary, Sathya *et al.* (2010) [17] and Wani and Mavi (2020) [23] reported non-significant variations in TLC count between dystocia-affected buffaloes and eutocia. The variations in the levels of TLC count in the present study might be due to stress induced by excessive manipulations to relieve the dystocia through different obstetrical maneuvers (Phogat *et al.*, 1991) [15].

The mean neutrophil count was significantly ($p < 0.05$) higher in fetal dystocia compared to eutocia buffaloes. The findings were analogous to the observations of Wani *et al.* (2018) [24], Arvind Kumar (2018) [5], Thangamani *et al.* (2019) [20] and Khan (2012) [12]. Higher neutrophil count might be due to the stress of dystocia, which increased the secretion of glucocorticoids from the adrenal gland, which in turn decreased the adhesion of neutrophils on the endothelium causing the neutrophils to shift from the marginal pool to general circulation resulting in neutrophilia (Andreassen *et al.* 2000) [4].

The mean lymphocyte count was significantly ($p < 0.05$) lower in fetal dystocia-affected buffaloes than eutocia. The findings

in the present study were in close agreement with the report of Khan (2012) [12], Wani *et al.* (2018) [24] and Abdelrazek *et al.* (2018) [1]. On the contrary, Thangamani *et al.* (2019) [20] found no significant difference in the mean lymphocyte count between fetal dystocia and eutocia buffaloes. Variations in the lymphocyte count of the present study might be due to the stress of assisted calving which induced the production of cortisol which in turn causes the sequestration of lymphocytes in the lymphoid tissues, hence it causes lymphopenia (Dukes, 2013) [8].

The mean monocyte count was significantly ($p < 0.05$) higher in fetal dystocia-affected buffaloes than eutocia buffaloes. The findings in the present study were in accordance with the previous reports of Yuksel *et al.* (2011) [25] who reported a significantly higher monocyte count in fetal dystocia-affected cows before relieving the dystocia compared to after relieving the dystocia while Abdelrazek *et al.* (2018) [1] recorded a significant increase in monocyte count on the day of parturition in Egyptian buffaloes. On the contrary, Wani *et al.* (2018) [24] found a non-significant difference between fetal dystocia-affected buffaloes and eutocia buffaloes.

Non-significant ($p > 0.05$) difference was observed for the mean eosinophil count in fetal dystocia and normally calved buffaloes. The findings in the present study were similar to the previous reports of Yuksel *et al.* (2011) [25]. On the contrary, Wani *et al.* (2018) [24] observed a significant increase in eosinophil count in fetal dystocia affected than normally calved buffaloes. Variations in the eosinophil count of the

present study might be due to dystocia-induced stress in which hypothalamic-adenohypophyseal adrenocorticotrophic response occurs and ACTH stimulates the production of cortisol from the adrenal cortex which reduces the eosinophilic count by enhancing eosinophilic diapedesis and decreasing the release of eosinophils from bone marrow (Dukes, 2013) [8].

3.2 Biochemical parameters

Biochemical changes were evident in both eutocia and fetal dystocia affected buffaloes due to stress, which results in generation of more reactive oxygen species which leads to alterations in biochemical profile (Sathya *et al.*, 2010) [17].

The results for biochemical parameters in fetal dystocia affected and normally calved buffaloes are presented in Table 2.

Table 2: Biochemical parameters (Mean \pm SE) in fetal dystocia and eutocia buffaloes.

S. No	Biochemical parameters	Group I (Eutocia)	Group II (Fetal dystocia)
1	Blood Urea Nitrogen (mg/dL)	16.67 \pm 1.59	19.14 \pm 1.77
2	Creatinine (mg/dL)	1.31 \pm 0.16	1.84 \pm 0.01**

Mean with different superscript (**) in a row differed significantly ($p < 0.01$)

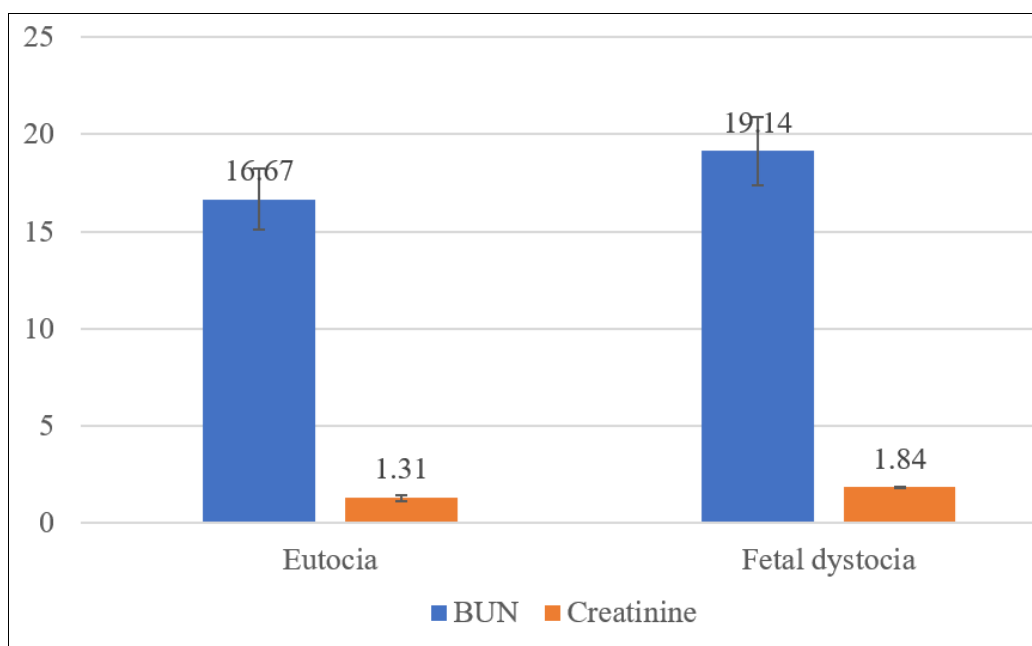


Fig 2: Biochemical changes in eutocia and fetal dystocia

In the present study, the mean BUN concentration was non-significantly ($p > 0.05$) increased in buffaloes with fetal dystocia than eutocia. The findings in the present study were similar to those of Khan (2012) [12], Arvind Kumar (2018) [5] and Thangamani *et al.* (2019) [21] who reported a non-significant increase in blood urea nitrogen concentration in fetal dystocia affected buffaloes than eutocia at the time of presentation. Divergently, Gomaa *et al.* (2021) [9] recorded non-significant decrease in serum urea levels on the day of parturition: Meanwhile Ali *et al.* (2020) [2] observed significantly higher levels of serum urea in dystocia-affected buffaloes than healthy buffaloes (control group) in southern irrigated zone and arid zone while non-significant increase was observed in dystocia affected buffaloes in northern irrigated zone of Punjab. The increased levels of BUN could be due to dehydration, dystocia induced stress and decreased blood flow to kidneys or reduced kidney function due to toxins released from the dead fetuses (Jeengar *et al.*, 2015) [11].

In the present study, the mean creatinine level was significantly ($p < 0.05$) higher in buffaloes with fetal dystocia than eutocia. The findings in the present study were in accordance with the reports of Khan (2012) [12] and Thangamani *et al.* (2019b) [21] who reported significant increase in creatinine levels in buffaloes with fetal dystocia compared to eutocia buffaloes. Similarly, Civelek *et al.* (2008) [6] observed a significantly higher creatinine concentration in fetal dystocia affected heifers than normally

calved heifers; while, Dhindsa *et al.* (2008) [7] found significantly higher plasma creatinine levels with increase in duration of dystocia. Divergently, Singh *et al.* (2009) [18] and Amardhurve (2015) [3] observed a non-significant increase in creatinine levels in buffaloes with fetal dystocia and eutocia buffaloes prior to than after relieving dystocia. In the present study, significantly higher creatinine levels in fetal dystocia affected buffaloes might be indicative of a more stressful condition when compared with eutocia buffaloes.

4. Conclusion

According to the findings of the present study, stress brought on by dystocia in buffaloes appears to change various hemato-biochemical markers. Changes of stress due to fetal dystocia were evident through leukocytosis, neutrophilia, lymphopenia, monocytosis and eosinopenia. Metabolites like blood urea nitrogen and creatinine levels are also elevated. In conclusion, haemato-biochemical profile could be used to assess the severity of the condition and prognosis.

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