Full Length Article

STUDIES ON HAEMATO-BIOCHEMICAL INDICES IN JERSEY CROSSBRED CATTLE AFFECTED WITH RETENTION OF FETAL MEMBRANES

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ABSTRACT

The present investigation was conducted to study the changes in the haemato-biochemical indices in normally calved crossbred cows with retention of placenta (n=60) and dystocia with retention of placenta (n=25) and compared with normally calved crossbred cows without retention of placenta (n=10) during the period between July 2022 to December 2023. Result showed that marked leukocytosis, lymphopenia, neutrophilia and eosinophilia in retention of fetal membrane (RFM) affected cows. Serum biochemical indices revealed significant increase ($p<0.05$) in the concentration of enzymatic parameters (aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase), decreased mineral parameters (calcium and phosphorus) and metabolic parameters in RFM affected cows. In conclusion, enzymatic, mineral and metabolic parameters can be used as biochemical indicators for the prediction of RFM in Jersey crossbred cows.

Keywords: Retention of placenta, crossbred cows, enzymatic, metabolic, mineral parameters

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INTRODUCTION

Retention of fetal membranes is one among the main reproductive post-partum disorders in dairy cattle after parturition. Multiple factors predispose the dairy cows and buffaloes to RFM. In farm animals, pregnancy loss can occur at any stage of gestation and it may be associated with expulsion of the dead fetus before term (abortion) or of a fully developed but dead fetus at term (still birth). Occasionally, failure of an aborted fetus to be expelled due to uterine inertia and intrauterine infections

results in emphysema and maceration which culminate to RFM (Monica *et al*., 2018). Moreover, abnormal calving such as assisted delivery, premature birth and fetal giants were considered as risk factors for the development of RFM in cows and buffaloes (Sheldon *et al*., 2006 and Kumari *et al*., 2015). Dynamics of blood components and biochemical milieu are important for normal parturition initiation process as well as contraction of uterine muscle for effective second stage (expulsion of fetus), third stage (expulsion of placenta) of labour, involution of uterus and early resumption of ovarian activity. Impairment in the haemato-biochemical changes result into RFM and moreover assisted delivery increased the risk RFM in cows and buffaloes (Srinivas *et al*., 2018). Reports on serum biochemical profile of cows affected with retained fetal membrane is meagre. Hence, the present study was conducted with the objective of estimation of serum biochemical profile and complete blood picture indices in crossbred cows affected with retained fetal membranes.

MATERIALS AND METHODS

The present study was carried out in crossbred cows with retained fetal membranes presented to Large Animal Obstetrics unit, Madras Veterinary College Teaching Hospital, Chennai from July 2022 to December 2023. Crossbred Jersey cows affected with retention of fetal membranes with or without dystocia (normal calving) were recorded. Retention of fetal membranes with dystocia in 25 cows and without dystocia in 60 cows were presented to the obstetrics unit and 10 normally calved crossbred cows without RFM brought for postpartum checkup were considered as control animals.

Clinical examination of animals

Cows with RFM were clinically examined and vital parameters such as temperature, respiratory rate and heart rates were monitored before obstetrical examination. Hanging of placental membranes from the vulval lips was obvious indication of retention of fetal membranes. Perineal region was thoroughly cleaned with 1% potassium permanganate solution. Pervaginal examination in cows showed dilatation of cervix with presence of fetal membranes intact. Cows were considered to retain their placenta if it does not drop after at least 12 hrs post normal or assisted calving.

Blood collection

Blood samples were collected from all animals with and without RFM by Jugular venipuncture for estimation of hematological and serum biochemical parameters. Hematological parameters include hemoglobin, packed cell volume, red blood cells count, white blood cells count, lymphocyte, neutrophils, monocytes, eosinophils and basophils. Serum biochemical parameters include total protein, enzymatic parameters (AST, ALTF, ALP), mineral parameters (calcium, phosphorous) and metabolic parameters (cholesterol, glucose) were analyzed using semi-automatic haemo-analyzer.

Statistical analysis

Hematological and serum biochemical parameters in control cows, normal calving with RFM and dystocia with RFM were compared using ANOVA as per the standard statistical analysis procedure and interpreted.

RESULTS AND DISCUSSION

Haematological and serum biochemical changes in control, normal calving with RFM and dystocia with RFM in crossbred Jersey cows are represented in Table 1 and 2. Haemoglobin, PCV concentration were not significantly altered in control, normal cows with RFM and dystocia with RFM affected cows. However, significantly decreased concentration of RBC levels was observed in dystocia with RFM affected cows. The decrease in concentration of RBC values in RFM affected cows of the present study might be due to production of endotoxin from the contaminated uterine environment as well as loss of body fluid from the degenerated blood vessels of the uterus responsible for decrease in concentration of RBC levels (Sivaraman *et al*., 2003 and Azawi, 2008).

Total WBC counts were significantly increased in both RFM affected cows as compared to cows without RFM. Dystocia affected cows with RFM had significantly higher WBC counts than normal cows with RFM. Lymphocytes counts showed a decreasing trend, whereas neutrophil counts showed increasing trend in RFM affected cows than cows without RFM. Monocytes and basophils counts were not significantly altered in all the cows with or without RFM. There was significant increase in the eosinophil count in RFM affected cows. The present findings were in consonance with the statements of Stockham and Scott (2008) who opined that decrease in the counts of lymphocytes occurs in response to acute bacterial, viral infection and endotoxemia. Similarly in the present study, dystocia with RFM induced stress and also the presence of fetal membranes introduced infection into the uterine lumen due to presence of fetal membranes. Normally lymphocytes numbers decreases during postpartum periods and continues its trend up to 2 months (Regan *et al*., 1998). Conclusively dystocia with RFM affected cows suffer from leukocytosis with lymphopenia, neutrophilia, monocytosis and eosinophilia which might be due to immune mechanism to scavenge the foreign debris in the uterus as well as in the peripheral circulation (Sivaraman *et al*., 2003 and Srinivas *et al*., 2018).

Total protein concentration was non-significantly decreased in RFM affected cows than cows without RFM. The present study was in agreement with the reports of Srinivas *et al*. (2018) who also documented non-significant decrease in total protein concentration in RFM affected animals. Non-significant decrease in the total protein concentration might be due to negative energy balance during periparturient period which might be due to the use of the body reserves such as body fat and protein to meet out the energy demands as opined by Reist *et al*. (2002).

All the enzymatic parameters (AST,

ALT and ALP) monitored in the present study significantly increased in RFM affected cows. The present study was in agreement with the reports of Srinivas *et al*. (2018) who also documented significant increase in alkaline phosphatase enzymes concentration in RFM affected animals. Hanging of fetal membranes or handling of dystocia may introduce the infection, inflammation followed by toxemia which leads to increased permeability and damage of cell membranes and escape of metabolic enzymes such as AST, ALT and ALP into the blood circulation (Mandali *et al*., 2002; Ray *et al*., 2004).

Mineral estimation in cows showed significant reduction in the calcium and phosphorus concentration in RFM affected cows. The present study was in accordance with the reports of Akhtar *et al*. (2008) and El-Malky *et al*. (2010). Decreased concentration of calcium and phosphorus in the crossbred cows might predispose the occurrence of retained placenta. Important component for the contractibility of the myometrium of the uterus is calcium and phosphorus which aided the uterine muscle to contract and expels the fetal membranes followed by lochia during post-partum period and also improves the uterine defense mechanisms. Lack of exercise, hypocalcaemia and hypophosphatemia might have reduced the uterine contractions. (Sheldon *et al*., 2006). Assisted delivery exhausted the uterine muscles by utilizing the excessive calcium and phosphorus mobilization from the peripheral circulation also possible in the occurrence of RFM. Moreover, during last trimester of pregnancy, there was mobilization of excessive calcium and phosphorus into the peripheral circulation that makes the lesser availability of calcium and phosphorus into myometrial tissues resulted in uterine inertia and risk of RFM (Mohanty *et al*., 1994 and Srinivas *et al*., 2018).

Metabolic parameters estimated in the present study showed decreased concentration of cholesterol and non-significant decrease of glucose concentration in cows with RFM than cows without RFM. The present findings were similar with the reports of Quiroz-Rocha *et al*. (2009) and Civelek *et al*. (2011), who found that lower levels of cholesterol in the circulation during pre-partum period might be responsible for development of retention of placenta.

CONCLUSION

Retention of fetal membranes delayed the postpartum activity and involution of uterus resulted in impaired fertility of dairy crossbred cows. Haemogram and serum biochemical components are of diagnostic importance to predict the risk of RFM. Enzymatic parameters (AST, ALT and ALP) and metabolic parameters (Cholesterol and glucose) acted as markers to forecast the incidence of RFM and institute the prompt prophylactic measures to reduce the incidence of RFM in crossbred cows.

Table 1: Changes in haematological parameters in control, normal calving with RFM and dystocia with RFM in crossbred cows

S.No.	Haematological parameters	Normal calving without RFM (Control, n=10)	Normal calving with RFM (n=60)	Dystocia with RFM (n=25)
1	Hb (g/dl)	12.92±0.56^{a}	10.44±0.28^{a}	9.65±0.54^{a}
2	PCV (%)	36.88±0.45^{a}	31.75±0.42^{a}	30.54±0.41^{a}
3	RBC (10^{6} /µl)	5.32±0.72^{a}	4.99±0.32^{a}	3.21±0.32^{b}
4	WBC (10^{3} /µl)	6.15±0.31^{a}	8.12±0.85^{b}	9.99±0.58^{c}
5	Lymphocytes (%)	60.66±0.35^{a}	55.23±0.21^{b}	50.44±0.47^{c}
6	Neutrophils (%)	38.57±0.15^{a}	43.09±0.65^{b}	49.14±0.69^{c}
7	Monocytes (%)	1.33±0.11^{a}	2.30±0.24^{a}	2.88±0.36^{a}
8	Eosinophils (%)	1.24±0.01^{a}	3.19±0.08^{bc}	4.44±0.22^{bc}
9	Basophils (%)	0.25±0.02^{a}	0.44±0.04^{a}	0.57±0.01^{a}

Group with superscripts (^{abc}) in a row differed significantly (P<0.05)

Table 2: Changes in serum biochemical parameters in control, normal calving with RFM and dystocia with RFM in crossbred cows

S.No.	Biochemical parameters	Normal calving without RFM (Control, n=10)	Normal calving with RFM (n=60)	Dystocia with RFM (n=25)
1	Total protein (g/dl)	6.75±0.15^{a}	6.14±0.25^{a}	5.44±0.22^{a}
2	AST (IU/L)	26.53±0.27^{a}	48.66±0.55^{b}	98.65±0.08^{c}
3	ALT (IU/L)	18.22±0.36^{a}	35.04±0.02^{b}	48.75±0.33^{c}
4	Alkaline phosphatase (IU/L)	18.80±0.23^{a}	27.36±0.14^{b}	42.58±0.66^{c}
5	Calcium (mg/dl)	9.54±0.17^{a}	7.22±0.31^{b}	5.05±0.27^{c}
6	Phosphorus (mg/dl)	5.21±0.30^{a}	4.20±0.22^{a}	3.10±0.37^{b}
7	Cholesterol (mg/dl)	120.02±0.36^{a}	111.22±0.65^{b}	97.65±0.54^{c}
8	Glucose (mg/dl)	55.69±0.59^{a}	51.07±0.33^{a}	49.24±0.21^{a}
9	Basophils (%)	0.25±0.02^{a}	0.44±0.04^{a}	0.57±0.01^{a}

Group with superscripts (^{abc}) in a row differed significantly (P<0.05)

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CONFLICT OF INTEREST

None

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