

COMPARATIVE HAEMATO-BIOCHEMICAL INDICES IN POSTPARTUM METRITIC CROSSBRED COWS TREATED WITH INTRAUTERINE *CURCUMA LONGA* WITH OR WITHOUT MICRONUTRIENT SUPPLEMENTATION

RAJENDER KUMAR, SANT PARSAD NEMA, MADHU SHIVHARE*, ASHOK KUMAR PATIL¹,
SOBHRAN SINGH MAHOUR and VINITA

Department of Veterinary Gynaecology and Obstetrics, ¹Department of Animal Nutrition,
College of Veterinary Science and A.H., MHOW- 453331
Nanaji Deshmukh Veterinary Science University, Jabalpur, M.P.

Received: 03.09.2021; Accepted: 24.09.2021

ABSTRACT

The study was carried out to evaluate the comparative haemato-biochemical indices in postpartum metritic crossbred cows treated with intra uterine infusion with *curcuma longa* extract with or without micronutrient oral supplementation. The study was conducted on 24 postpartum metritis affected crossbred cows randomly allocated to four treatment groups viz. intrauterine *Curcuma longa* (group I), intramuscular ceftiofur sodium (group II), intrauterine *Curcuma longa* + micronutrient supplementation (group III) and intramuscular ceftiofur sodium + micronutrient supplementation (group IV). The mean TLC values, neutrophil count, total protein were significantly higher ($P < 0.05$) before treatment as compared to the values after treatment in all the groups. The mean lymphocyte count- and Albumin: Globulin (A: G) ratio significantly ($P < 0.05$) increased after treatment as compared to before treatment.

Keywords: A: G ratio, Ceftiofur sodium, *Curcuma longa*, Micronutrient, Postpartum metritis

How to cite: Kumar, R., Nema, S.P., Shivhare, M., Patil, A.K., Mahour, S.S. and Vinita (2022). Comparative haemato-biochemical indices in postpartum metritic crossbred cows treated with intrauterine *Curcuma longa* with or without micronutrient supplementation. *Haryana Vet.* 61(SI-2): 20-23.

Reproduction plays crucial role in entire farm economy as it is the basis of production. Economy of dairy farming mainly depends on conception rate of dairy animals. Post partum period is the most crucial transitory phase in bovine reproductive life due to various physiological, biochemical and gynaeco-clinical changes. Metritis is defined as inflammation of both endometrial and muscular layers of the uterus. Postpartum metritis is one of the most important disorders in cows causing high economic losses due to prolonged days open and inter-calving intervals, resulting in involuntary culling of animal. It is more common in early postpartum period as uterus is exposed to high risk of infection. To reduce these high economic losses effective ameliorative measures are needed. Postpartum metritis is clinically characterized by incomplete or delayed uterine involution, enlarged uterus on rectal palpation with exhibiting varying amount of purulent and mucopurulent discharge through vulva, reduced appetite and milk yield.

Several approaches have been employed to treat postpartum metritis cows. Trace elements are needed for vitamin synthesis, hormone production, enzyme activity, energy production and other physiological processes related to growth, reproduction and health. In India, around 2000 medicinal plants have been recorded and more than 500 traditional communities are using about 800 plants for curing different diseases. Role of many medicinal herbs like Ashwagandha, Eucalyptus, Garlic,

Turmeric etc. have been recognized to manage the problems of infertility. Turmeric (*Curcuma longa*) extracts has been found to suppress the growth of several bacteria such as *Streptococcus*, *Staphylococcus* and *Lactobacillus*.

MATERIALS AND METHODS

The present study under report was carried out on the clinical cases brought to the Teaching Veterinary Clinical Complex of College of Veterinary Science and A.H., Mhow and villages in and around Mhow.

Experimental Design: The postpartum metritic dairy cows (n=24) were randomly selected on the basis of calving history, gynaeco-clinical findings such as presence of abnormal uterine discharge and other associated findings, and were allocated equally into four groups.

Group I: Cows in this group (n=6) were administered with intrauterine *Curcuma longa* extract having concentration @ 20 mg/ml dissolved in saline to make 30 ml, at 24 hrs interval for 3 days.

Group II: Cows in this group (n=6) were administered with intramuscular Ceftiofur Sodium @ 2.50 mg/kg B.W. at 24 hrs interval for 3 days.

Group III: Cows in this group (n=6) were administered with intrauterine *Curcuma longa* extract having concentration @ 20 mg/ml dissolved in saline to make 30 ml, at 24 hrs interval for 3 days+25gm micronutrients (Each kg of micronutrients supplement contains 750000 I.U. Vit. A, 75000 I.U. Vit. D3, 300 mg Vit. E, 20 mg Vit.

*Corresponding author: drmadhushivhare@gmail.com

B6, 25 mg biotin, 150 mg cobalt, 350 mg iodine, 1500 mg iron, 1200 mg copper, 1000 mg nicotinamide, 6000 mg mg, 10 mg selenium, 5.9 mg sodium, 9600 mg zinc, 100 mg manganese, 25% calcium, 12.75% phosphorus, 0.70% sulfur, 5000 mg choline chloride, 500 mg *Saccharomyces cerevisiae*) orally for 20 days.

Group IV: Cows in this group (n=6) were administered with intramuscular Ceftiofur Sodium @ 2.50 mg/kg B.W. at 24 hrs interval for 3 days + 25 gm micronutrients orally for 20 days.

Collection of blood samples: Seven ml of blood from each cow was collected aseptically from jugular vein in sterile vials on the day of treatment and on the subsequent estrus. The sample was divided into two parts. The 1st part for haematological examination containing anticoagulant (EDTA @ 2 mg/ml) and 2nd part was allowed to clot in plane test tube for serum separation and stored in a sterilized vial at -20°C until biochemical analysis.

Haemato-Biochemical parameters: Total Leukocyte Count (thousand/cu.mm) was done as per method described by Jain (1986). Differential leukocyte count (percentage) was done using Wright's stain. The glucose (mg/dl) and total protein (g/dl) were estimated with the help of semiautomatic biochemical analyzer using test kit. Further, albumin globulin ratio was determined by dividing albumin value with the globulin value.

Statistical Analysis: Statistical analysis of different attributes was done by completely randomized design as described by Snedecor and Cochran (1994).

RESULT AND DISCUSSION

Haematological Parameters

Total Leukocyte Count (thousand/cu. mm): The mean total leukocyte count before treatment were recorded as 9.92±0.38, 10.35±0.32, 11.19±0.30 and 11.03±0.23 (thousand/ cu.mm) in Group I, II, III and IV, respectively. The corresponding values after treatment (at subsequent oestrus) were recorded as 9.10±0.40, 9.23±0.14, 9.00.30, and 9.20±0.20 (thousand/cu.mm) (Table 1). The difference between before and after treatment values was found to be significant at (P<0.05) in all the treatment groups. It was observed that all the treatment protocols reduced the total leukocyte count significantly that indicated clearance of infection from the uterus. The present findings are in close accordance with the findings of Patil (2010) and Al-Mohammed *et al.* (2013) who reported significant (P<0.05) reduction in total leukocyte counts after treatment. The increase total leukocyte counts values in present study, similarly observations were recorded by Bhuyan *et al.* (2017), they reported increased leukocyte count in metritis affected animals which might be due to stress coupled with

inflammatory changes in tissues. The significant decrease observed during post-treatment period may be due to the effectiveness of drugs with progression of days postpartum as also indicated by Pateria *et al.* (1992).

Table 1. Total Leukocyte Count (Mean ± SE) before and after treatment in crossbred cows

Groups (n=6)	Total Leukocyte Count (10 ³ /cu.mm)	
	Before treatment	After treatment
I	9.92±0.38 ^a	9.10±0.40 ^b
II	10.35±0.32 ^a	9.23±0.14 ^b
III	11.19±0.30 ^a	9.0±0.30 ^b
IV	11.03±0.23 ^a	9.20±0.20 ^b

Mean with different superscript differ significantly from each other (p<0.05)

Differential Leukocyte Count (%)

Neutrophil: In present study, the mean neutrophil counts before treatment were 40.83±0.83, 40.06±0.47, 43.0±0.89 and 43.33±0.88 percent in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 37.50±0.76, 36.50±0.42, and 37.16±0.79 and 37.33±0.84 percent (Table 2).

Difference between pre and post treatment values was found to be significant (P<0.05) in all the treatment groups. It was observed that neutrophil count was reduced significantly (P<0.05) in all the treated cows. Similar findings were recorded by Ahmad *et al.* (2003) in endometritic cows and Patil (2010) in metritic buffaloes. However, higher values of neutrophils were observed by Al-Mohammed *et al.* (2013) and Bhuyan *et al.* (2017) as compared to the present study, they reported that it might be attributed to the inflammatory lesions in the uterine wall leading to neutrophilia through cytokines produced in the affected tissue.

The present study also indicated that the body released more neutrophils when the animals were under stress due to inflammatory changes caused by bacterial invasion and the values returned to normal when infection is cleared due to treatment as well as restoration of body defence mechanism.

Lymphocyte: In present study, the mean lymphocyte count before treatment were recorded to be 49.50±1.02, 51.33±0.49, and 51.50±0.56 and 51.66±0.49 percent in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 52.16±1.04, 53.83±0.65, and 54.66±0.61 and 55.33±0.33 percent (Table 2). Lymphocyte count differed significantly (p<0.05) before and after treatment in all the groups. It was observed that lymphocyte count significantly higher (p<0.05) in cows after treatment as compared to cows before treatment in all the groups.

Table 2. Differential Leukocyte Count (Mean ± SE) before and after treatment in crossbred cows

Groups (n=6)	Neutrophil		Lymphocyte		Monocyte		Eosinophil	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
I	40.83±0.83 ^a	37.50±0.76 ^b	49.50±1.02 ^b	52.16±1.04 ^a	4.16±0.30	4.33±0.71	5.66±0.98	6.0±0.36
II	40.06±0.47 ^a	36.50±0.42 ^b	51.33±0.49 ^b	53.83±0.65 ^a	3.66±0.33	4.66±0.21	4.83±0.40	5.16±0.30
III	43.0±0.89 ^a	37.16±0.79 ^b	51.50±0.56 ^b	54.66±0.61 ^a	3.16±0.47	4.66±0.33	2.33±0.21	3.83±0.30
IV	43.33±0.88 ^a	37.33±0.84 ^b	51.66±0.49 ^b	55.33±0.33 ^a	3.0±0.51	4.16±0.47	2.0±0.25	3.16±0.30

Mean with different superscript differ significantly from each other (p<0.05)

These findings are in agreement with the findings of Patil (2010), studied on 40 postpartum metritic Surti buffaloes and divided them equally into five groups (four therapeutic and one control), metronidazole, ciprofloxacin and tinidazole, ciprofloxacin and tinidazole plus PGF2 α , ceftiofur and normal saline, who recorded increased lymphocyte counts after treatment. Al-Mohammed *et al.* (2013) studied on 56 Holstein-Friesian cows suffering from puerperal metritis. He divided cows in three groups and treated with PGF2 α (Estrumate) alone and along with oxytetracycline and Pen-Strep (4 million i.u. of penicillin mixed with 4 gm of dihydrostreptomycin). In contrast to this, Ahmad *et al.* (2003) reported a non significant difference in mean value of lymphocyte count between the groups. However, lower value than the present study was recorded by Bhuyan *et al.* (2017) in metritic cows (40.25±1.17%). He mentioned that lymphopaenia might be due to extravasation of lymphocyte from circulation to the site of infection or inflammation.

Monocyte: In present study, the mean monocyte count before treatment was recorded to be 4.16±0.30, 3.66±0.33, 3.16±0.47 and 3.0±0.51 percent in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 4.33±0.71, 4.66±0.21, and 4.66±0.33 and 4.16±0.47 percent (Table 2). Non-significant increase in monocyte percentage was recorded after treatment. These findings are in agreement with Ahmad *et al.* (2003) studies on crossbred cows suffering with clinical endometritis were aligned into three groups randomly. The first group (n=115) received PGF2 α , the second group (n=84) received intrauterine infusion (IUI) of oxytetracycline 10% + PGF2 α and the third group (n=200) received IUI (intrauterine infusion) and Patil (2010) who also did not find significant difference in the mean value of monocyte counts between the periods. In contrast, Al-Mohammed *et al.* (2013) recorded significant decrease in monocyte counts (1.60±0.13%) after treatment as compared to the pre-treated (1.89±0.28%) and metritic cows. Bhuyan *et al.* (2017) recorded 3.92±0.08% monocytes in metritic cows which is similar to present findings.

Eosinophil: In present study, the mean eosinophil count before treatment was recorded as 5.66±0.98, 4.83±0.40, and 2.33±0.21 and 2.0±0.25 percent in Group I, II, III and IV, respectively. The respective values at subsequent oestrus after treatment were 6.0±0.36, 5.16±0.30, 3.83±0.30 and 3.16±0.30 (Table 2). Statistically non significant increase in eosinophils was recorded after treatment.

These findings are in agreement with Ahmad *et al.* (2003) who recorded non significant differences in eosinophil values of endometritic and cyclic cows. Similar findings to present study are reported by Patil (2010) in postpartum metritic buffaloes. Al-Mohammed *et al.* (2013) and Bhuyan *et al.* (2017) also observed non significant differences in eosinophil values in metritic and healthy cows.

Biochemical parameters

Glucose (mg/dl): In present study, the mean glucose values were 39.40±0.97, 39.39±0.68, and 38.75±0.64 and 38.94±0.75 mg/dl before treatment in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 43.41±1.01, 45.35±0.62, 44.06±0.39 and 45.32±0.77 mg/dl (Table 3). The difference between before and after treatment (oestrus) values were statistically non significant lower value than the present study were recorded by Magnus and Lali (2009) who observed 22.3±2.18 mg/dl serum glucose in postpartum metritic cows. Hamedawi (2016) was also found 28.4±3.27 mg/dl glucose in septic metritis and puerperal metritis affected cows.

Total protein (g/dl): In present study, the mean total protein values were 7.28±0.12, 6.86±0.19 and 7.21±0.24 and 7.07±0.26 g/dl before treatment in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 6.47±0.19, 5.99±0.29, 5.84±0.24 and 5.50±0.22 g/dl (Table 3). Difference between before and after treatment values was significant (p<0.05) in all treatment groups. The serum total protein was significantly higher (p<0.05) in cows before treatment as compared to cows after treatment in all the groups.

Table 2. Differential Leukocyte Count (Mean ± SE) before and after treatment in crossbred cows

Group (n=6)	Total protein (g/dl)		Glucose (mg/dl)		A:G (mg/dl)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
I	7.28±0.12 ^a	6.47±0.19 ^b	39.40±0.97	43.41±1.01	0.60±0.02 ^b	0.65±0.01 ^a
II	6.86±0.19 ^a	5.99±0.29 ^b	39.39±0.68	45.35±0.62	0.63±0.01 ^b	0.69±0.01 ^a
III	7.21±0.24 ^a	5.84±0.24 ^b	38.75±0.64	44.06±0.39	0.61±0.01 ^b	0.70±0.0 ^a
IV	7.07±0.26 ^a	5.50±0.22 ^b	38.94±0.75	45.32±0.77	0.63±0.01 ^b	0.70±0.01 ^a

Mean with different superscript differ significantly from each other (p<0.05)

Our findings are in close approximation with Magnus and Lali (2009) who found 6.1±0.51 g/dl total protein in postpartum metritic cows. In contrast to this, Patil (2010) revealed that mean values of plasma total protein on day 6 post-treatment in metritic buffaloes were significantly (p<0.01) higher than the pre-treatment values. Similarly, Musal *et al.* (2004), Ghawi and Al. Hamedawi (2016) and Bhuyan *et al.* (2017) reported a non significant difference in total protein values of metritic and healthy cows. The elevated total serum protein may be due to infection and there is usually a change in the albumin: globulin ratio with an increase in the total globulins.

Albumin: Globulin ratio: In present study, the mean A:G ratios were 0.60±0.02, 0.63±0.01, 0.61±0.01 and 0.63±0.01 before treatment in Group I, II, III and IV, respectively. The respective values after treatment (at subsequent oestrus) were 0.65±0.01, 0.69±0.01, 0.70±0.0 and 0.70±0.01 (Table 3). The difference between before and after treatment values was found to be significant (p<0.05) and A: G ratio increased in all the treated cows.

Similarly, Patil (2010) also found significantly (P<0.01) higher A:G ratio after treatment in postpartum metritic buffaloes, which is similar to present findings. In contrary to this, Sivaraman *et al.* (2003) reported that cows infected with metritis showed significant (P<0.05) decrease in both albumin and globulin fraction.

Magnus and Lali (2009) reported that cows infected with metritis showed altered albumin globulin ratio. Globulin was higher than the albumin fraction. He reported that globulin fraction increases in case of bacterial infection. In contrast to this, Musal *et al.* (2004) reported a non significant difference in A:G ratio in metritic and healthy cows. The decreased A:G ratio observed in our study in cows with inflammatory disease may be related to the overproduction of globulins, caused by the disease.

CONCLUSION

Leukocytosis with neutrophilia, hyperproteinemia and decreased A:G ratio associated with postpartum metritis in the crossbred cows. Ceftiofur sodium and turmeric

extract along with micronutrient had better therapeutic efficacy for treatment of postpartum metritis in cows as compared to without micronutrient supplementation.

ACKNOWLEDGEMENT

The authors are thankful to Head of Department, Department of Gynaecology and Dean, College of Veterinary Sciences & A.H., Mhow, Nanaji Deshmukh Veterinary Science University, Jabalpur (M.P.) for providing necessary facilities.

REFERENCES

- Ah Ahmad, I., Gohar, A., Ahmad, N. and Ahmad, M. (2003). Haematological profile in cyclic, non-cyclic and endometritic crossbred cattle. *Int. J. Agric. Biol.* **5(3)**: 332-334.
- Al-Mohammed., T.M., Mohammed, A.H. and Al-shaty, E.R. (2013). Clinical haematological and therapeutical study of puerperium metritis in Holstein- Friesian cows. *J. Kerbala Univ.* **11(1)**: 131-135.
- Bhuyan, M., Nath, K.C., Deka, B.C., Bhuyan, D., Goswami S. and Sarma, R.K. (2017). Comparative hematological and biochemical parameter study on normal and metritic cows. *Int. J. Chem. Stud.* **5(3)**: 77-79.
- Ghawi, A.K. and Al. Hamedawi, T.M. (2016). Serum biochemical profile study on septic and puerperal metritis in Iraqi cows. *Int. J. Adv. Res. Biol. Sci.* **3(8)**: 160-162.
- Jain, N.C. (1986). Schalm's Veterinary Hematology (4th Edn.), Lea and Febinger, Philadelphia.
- Magnus, P.K. and Lali, F.A. (2009). Serum biochemical profile of postpartum metritic cow. *Vet. World.* **2(1)**: 27-28.
- Musal, B., Seyrek, K. and Ulutas, P.A. (2004). Serum sialic acid, total protein and albumin levels in cows with metritis treated with intrauterine oxytetracycline. *Uludag. Univ. J. Fac. Vet. Med.* **23(1-3)**: 71-75.
- Pateria, A.K., Rawal, C.V.S. and Sharma, M.C. (1992). Studies on some clinico therapeutic aspects of metritis in buffaloes. *Buffalo Bull.* **11(4)**: 75-80.
- Patil, R.D. (2010). Studies on haemato-biochemical, hormonal and therapeutic aspects of postpartum metritis in surti buffaloes. MVSc thesis submitted to Anand Agricultural University, Anand (Gujrat, India).
- Sivaraman, T., Shanmugasundaram, S., Arunachalam, S. and Sivakumar, T. (2003). Blood profile constituents associated with production diseases in Jersey crossbred cows. *Indian J. Anim. Sci.* **73(1)**: 44-47.
- Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods (8th Edn.) The Iowa state college press, INC. American Iowa, (USA).