



Original Research

Clinical Efficacy of Ceftiofur Sodium, Gentamicin Sulfate and Zingiber officinal on Serum Biochemical Constituents of Endometritic Buffaloes

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Abstract

The present study aimed to investigate the comparative therapeutic efficacy of Ceftiofur sodium, Gentamicin sulphate and Zingiber officinale extract on serological parameters (glucose, calcium, phosphorus, cholesterol, albumin and total protein) of endometritic buffaloes. The endometritic affected animals were randomly allotted to five groups namely- Groups A, B, C, D and E comprising of ten animals in each group. Blood samples were collected by jugular venipuncture at three times (0, 15th and 30th day) during the whole study period. The serological profile differed significantly among normal cyclic, endometritic buffaloes Ceftiofur sodium, Gentamicin sulfate and Zingiber officinale extract treated animals. The findings indicated that variation of values subsequent effect reproductive performance of Murrah buffaloes and analysis helps in diagnosis of clinical endometritis.

Key words: Ceftiofur Sodium, Endometritis, Gentamicin Sulfate, Serum Biochemical Constituents, Zingiber officinale

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Introduction

Endometritis is described as inflammation of the innermost layer of the uterus and limited to the endometrium (Palmer, 2015). Endometrial inflammation involves disruption of the epithelium layer, increased blood flow or edema in the uterus, and an influx of inflammatory cells, mostly neutrophils, and lymphocytes (LeBlanc, 2008). The normal blood constituents are indispensable for the normal function of various systems of the body including the reproductive system (El-Azab *et al.*, 1993; Balakrishnan and Balagopal, 1994; Qureshi, 1998). Changes in various hematological and biochemical constituents may affect the reproductive function and lead to reproductive failures. According to Duke (1970), blood glucose



appears to be one of the key nutrients affecting normal cyclicity in farm animals and a minimum level of 40-60 mg/ml is required to maintain the essential physiological processes of the body. Cholesterol is a precursor of steroid hormones and its higher blood concentrations in the pregnant buffaloes group suggested a better ovarian activity, hence a successful ovulation and fertilization after the hormonal stimulus. Calcium (Ca) is a mineral that plays a central role in maintaining the homeostasis of vertebrate animals, including muscle contraction, blood coagulation, enzyme activity, neural excitability, hormone secretion, and cell adhesion in addition to being an essential structural component of the skeleton and also involved in the pathogenesis of metabolic diseases that disrupt the normal regulation (Thomas and Charles, 1997).

Materials and Methods

The present investigation was carried out at fifty buffaloes in which ten were regular cyclic buffaloes and forty animals were affected with endometritis. The investigation was performed between August 2017 and April 2018. Blood samples were collected by jugular venipuncture at three times (0, 15th and 30th day) during the whole study period. Blood serum was separated by 15-min centrifugation at 3000×g and stored at -20°C until analysis. The buffaloes were divided into five treatment groups namely, normal cycling healthy estrus buffaloes (Group A), animals recommended for sexual rest up to one reproductive cycle (Group B), Gentamicin sulfate 400 mg intrauterine daily for three days (Group C), Cefotiofur sodium 500 mg intrauterine daily for three days (Group D) and one gram extract of *Zingiber officinale* (dissolved in 50 ml of distilled water) intrauterine daily for three days (Group E). *Zingiber officinale* extract was prepared in Soxhlet apparatus as per standard method and then concentrated in vacuum rotary evaporator at 40°C for ethanol removal. One gram concentrated extract was mixed in double distilled water in floor shaker water bath used for intrauterine therapy.

Endometritic Murrah buffaloes of II to V parity were selected for present research work and animals were screened with per-rectally examination to rule out any anatomical defect of genitalia and ovarian abnormalities. Serum concentrations of glucose, calcium, phosphorus, cholesterol, albumin and total protein were assayed through commercial kit (Diagnostic Reagent Kit manufactured by Arkray Healthcare Pvt. Ltd., India).

Result and Discussion

The overall mean values of calcium in pretreated, 15th and 30th day post-treated and in regular cyclic buffaloes, were given in Table 1. Calcium levels were increased significantly ($p < 0.001$) in Gentamicin sulfate (C) and Cefotiofur sodium (D) groups after 15th and 30th-day of post-treatment. Calcium plays a key part in improving the number and size of an ovarian preovulatory follicle and the ovulation rate (Erickson, 2008). The deficiency of calcium may results in reduces tone and contraction of the uterine muscle, which

ultimately prevents forward movement of sperm and ovum in the opposite direction, results in inhibition of zygote formation and subsequent fertilization (Hopper, 2015).

Table 1: Effect of Gentamicin sulfate, Ceftiofur sodium and *Zingiber officinale* extract on calcium, total protein, glucose, albumin, cholesterol and phosphorus (Mean±S.E.) in endometritis buffaloes

Group Name	Calcium (mg/dl)	Total-protein (gm/dl)	Glucose (mg/dl)	Albumin (gm/dl)	Cholesterol (mg/dl)	Phosphorus (mg/dl)
A	10.07±0.24***	8.57±0.16***	60.07±2.41	3.84±0.12*	80.9±2.32	5.09±0.12***
B0	7.93±0.20	7.22±0.12	63.56±1.90	3.39±0.18	82.48±2.56	3.95±0.11
B15	7.95±0.20	7.09±0.11	66.15±2.11	3.35±0.10	82.65±3.09	3.91±0.13
B30	7.74±0.19	6.98±0.11	67.02±2.08	3.31±0.12	82.89±2.20	3.93±0.11
C0	8.19±0.22	7±0.97	67.43±2.28	3.55±0.11	80.5±1.29	4.07±0.9
C15	10.09±0.34***	7.78±0.16*	63.1±2.39	3.84±0.07*	82.9±0.72	5.06±0.18***
C30	10.3±0.31***	8.3±0.17***	61.2±2.22	3.92±0.07**	81.02±1.13	5.29±0.16***
D0	8.93±0.29	6.97±0.18	69.75±1.60	3.66±0.11	79.24±2.65	4.45±0.14
D15	10.12±0.22***	8.49±0.14***	59.5±2.43	3.38±0.14	80.9±2.32	5.05±0.12***
D30	10.3±0.28***	8.58±0.13***	59.1±1.91	3.84±0.15*	80.3±2.38	5.12±0.15***
E0	7.98±0.20	7.2±0.11	63.6±1.65	3.37±0.10	82±2.21	3.99±0.10
E15	10.11±0.33***	7.84±0.13*	64±2.35	3.77±0.08	82.6±0.52	5.06±0.18***
E30	10.34±0.318***	8.35±0.13***	62.4±2.21	3.86±0.06*	80.9±1.37	5.08±0.18***

The mean value of phosphorus in regular cyclic buffaloes group (A) was observed as 5.09±0.12 (mg/dl). Phosphorus values were reported as 3.95±0.11, 3.91±0.13 & 3.93±0.11 (mg/dl) in untreated control, 4.07±0.9, 5.06±0.18 & 5.29±0.16 (mg/dl) in Gentamicin sulfate group (C), 4.5±0.14, 5.05±0.12 & 5.12±0.15 (mg/dl) in Ceftiofur sodium (D) groups and 3.99±0.10, 5.06±0.18 & 5.08±0.18 in *Zingiber officinale* extract at 0, 15th and 30th day post-treatment, respectively (Table 1). Significant (p<0.001) increase in phosphorus was observed in all the treatments at 15th and 30th-day post-treatment. In contrast, reported by Chandrahar *et al.* (2003), Jayachandran *et al.* (2007), Panday *et al.* (2009), Amle *et al.* (2014), and Verma (2015). Deficiency of phosphorus, in particular, influences at the level of pituitary and ovary and maybe interferes with fertilization causing early embryonic death, thereby produce aberrations in the normal reproductive rhythm since phosphorus is essential for transfer of biological energy especially through ATP (Du Plessis *et al.*, 1999). Interestingly, low values of inorganic phosphorus could be due to some metabolic alterations in the plasma of endometritic buffaloes, in the present study. Disturbances in the ovulation along with pituitary-ovarian axis could cause by the marginal deficiency of phosphorus (Bhaskaran and Patil, 1982). On the contrary, the excess of phosphorus renders the endometrium susceptible to infection (Chaudhary and Singh, 2004).

Total protein in regular cyclic buffaloes was recorded as 8.57±0.16 (gm/dl), whereas these values were slightly lower in repeat breeder as well as pretreated animals. The means of total protein in treated groups at 0, 15th and 30th day were 7±0.97, 7.78±0.16 and 8.3±0.17 (gm/dl) in Group (C); 6.97±0.18, 8.49±0.14

and 8.58 ± 0.13 (gm/dl) in Group (D) and 7.2 ± 0.11 , 7.84 ± 0.13 and 8.35 ± 0.13 (gm/dl) in Group (E) was recorded (Table 1). Total protein levels were decreased significantly ($P < 0.001$) after 15th and 30th day in Ceftiofur sodium group and 30th day in Gentamicin sulfate and *Zingiber officinale* extract treated groups. Low serum protein is reported to affect the process of implantation (Roberts, 1971). Low level of plasma protein resulted in the deficiency of certain amino acid required for the biosynthesis gonadotropins and gonadal hormones (Vohra *et al.*, 1995). Infection caused hypo-albuminemia due to fall in the level of albumin mRNA in response to infection parallel to a decrease in intrahepatic albumin synthesis due to liver damage. Also, an infection can lead to increased catabolic rate and redistribution of albumin from plasma to interstitial compartment (Benoit *et al.*, 2000). This was one of reason to increase total protein level in the affected animal.

The mean value of serum glucose in regular cyclic buffaloes was 60.07 ± 2.41 (mg/dl) recorded. Whereas in control Group (C) increased values were recorded (63.56 ± 1.90 , 66.15 ± 2.11 & 67.02 ± 2.08 mg/dl). The means of glucose in treated groups at 0, 15th and 30th day were 67.43 ± 2.28 , 63.1 ± 2.39 & 61.2 ± 2.22 (mg/dl) from Group (G); 69.75 ± 1.60 , 59.5 ± 2.43 & 59.1 ± 1.91 (mg/dl) from Group (D) and 63.6 ± 1.65 , 64 ± 2.35 & 62.4 ± 2.21 (mg/dl) from Group (E) were recorded (Table 1). In all the treated groups, there was a decreased level of total glucose was recorded with no significant difference. The group which recommended for sexual rest, the serum glucose value is in accordance with the results of Majeed *et al.* (1990) and Ahmad *et al.* (2004) reported a significantly higher value of glucose in endometritic buffaloes and cows, respectively. Increased blood glucose level in endometritic animals may result from either an imbalance between hepatic output and peripheral uptake of sugar or disturbances in the endocrine regulatory mechanisms (Ahmad *et al.*, 2004). Increased activity of anterior pituitary, adrenal cortex and thyroid may result in the increased blood glucose level (Coles, 1986). Hypoglycemia is reported to be responsible for infertility in lactating animals (Roberts, 1971).

The mean value of albumin in regular cyclic buffaloes was recorded as 3.84 ± 0.12 (gm/dl). Whereas these values were slightly lower in repeat breeder as well as pretreated animals. The means of albumin in treated groups at 0, 15th and 30th day were 3.55 ± 0.11 , 3.84 ± 0.07 & 3.92 ± 0.07 (gm/dl) from Group (C0); 3.66 ± 0.11 , 3.38 ± 0.14 & 3.84 ± 0.15 (gm/dl) from Group (D) and 3.37 ± 0.10 , 3.77 ± 0.08 & 3.86 ± 0.06 (gm/dl) from Group (E) also present in Table 1. Albumin levels were increased significantly ($P < 0.05$) after 30th-day of post-treatment in Ceftiofur sodium and *Zingiber officinale* treated groups. Low level of serum albumin, deficiency of protein may cause reproductive differences in the animals resulting in the active ovary (Roberts, 1986). The mean value of cholesterol in regular cyclic buffaloes group (A) was observed as 80.9 ± 2.32 (mg/dl). The cholesterol values were reported as 82.48 ± 2.56 , 82.65 ± 3.09 & 82.89 ± 2.20 (mg/dl) in untreated control, 80.5 ± 1.29 , 82.9 ± 0.72 & 81.02 ± 1.13 percent in Gentamicin sulfate treated group, 79.24 ± 2.65 , 80.9 ± 2.32 & 80.3 ± 2.38 (mg/dl) in Ceftiofur sodium treated groups and 82 ± 2.21 , 82.6 ± 0.52 &



80.9±1.37 (mg/dl) in *Zingiber officinale* extract at 0, 15th day and 1 month post treatment, respectively (Table 1).

Conclusion

The analysis of data concluded that biochemical profile was differed significantly between cyclic and repeat breeder buffaloes, so that these parameters may be supportive in the diagnosis of endometritis buffaloes. *Zingiber officinale* (ginger) extract can utilize as low cost remedy for therapeutic management of endometritis affected buffaloes and can also be utilize for treatment of uterine infections in animals reared for organic milk production program.

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