Advances in Bioresearch
Adv. Biores., Vol 9 (2) March 2018: 38-50
©2018 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.9.2.3850

Advances in Bioresearch

ORIGINAL ARTICLE

Haematological study and serum biochemical profile of Endometritic repeat breeder cows

Anand Kumar[1], Sushant Srivastava[1], Shiv Kumar Yadav[2], Alok Kumar Yadav[3]*, Vikas Chaudhary[1] and Saurabh[1]

1-Department of veterinary Gynaecology & Obstetrics, College of Veterinary Science & Animal Husbandry, N.D.U.A. & T., Kumarganj, Faizabad-224 229 (U.P.)

2- Department of Veterinary Physiology & Biochemistry, College of Veterinary Science & Animal Husbandry, N.D.U.A. & T., Kumarganj, Faizabad-224 229 (U.P.)

3*Ph.D. Scholar, AGB Division, ICAR-NDRI., Karnal, Haryana, India.

ABSTRACT

The present study was designed to assess the therapeutic efficacy of levofloxacin and ethno-veterinary medicine (Tinospora cordifolia, Withania somnifera and its combination) on therapeutic management of endometritic repeat breeder cows. Forty (n=40) endometritic affected repeat breeder cows were selected which, were presented at veterinary hospital lying adjacent to Kumarganj area (Khandasha) and animal of villages in vicinity of university. The diseased cows were divided into five groups (G_1, G_2, G_3, G_4 and G_5), each comprising of eight (n=8) animals. Animals of group G_2 were treated with levofloxacin while G_3, G_4 and G_5 groups were treated with herbal medicine i.e Tinospora cordifolia, Withania somnifera and its combination respectively whereas, untreated animal were served as control (G_1). Haemoglobin, packed cell volume, erythrocyte sedimentation rate, lymphocytes and monocytes were significantly higher ($P<0.05$) in normal cyclic cows as compared to repeat breeder cows. A significantly higher ($P<0.05$) values of serum glucose and total protein were observed in repeat breeder cows compared with normal cyclic cow whereas, calcium and phosphorus level were significantly lower in repeat breeder cows. On the basis of present study, it is concluded that levofloxacin, giloy, ashwagandha and its combination have effective roll in the treatment of endometris in cows. Levofloxacin is more effective than ethno-veterinary medicine. Giloy, ashwagandha and its combination having an immunomodulator, antibacterial, anti-inflammatory & anti-infective properties which can be utilize as alternative low cost medicine for treatment of endometritis in repeat breeder cows.

Key words: *Therapeutic efficacy of levofloxacin and ethno-veterinary medicine, Endometritic repeat breeder cows.*

Received 21.11.2017 Revised 10.12.2017 Accepted 20.02.2018

How to cite this article:
A Kumar, S Srivastava, S K Yadav, A K Yadav, V Chaudhary and Saurabh. Haematological study and serum biochemical profile of Endometritic repeat breeder cows. Adv. Biores., Vol 9 [2] March 2018.38-50.

INTRODUCTION

Livestock is an important source of income and employment in rural sector. The incidence of repeat breeding has 5-32% in cows and 6-30% in buffaloes [14]. Repeat breeding is one of the major causes (40%) of infertility in dairy cows [7] passing considerable economic losses to dairy farmers. Repeat breeding is one of the important causes of infertility in cattle that results in delayed conception and increased calving interval, loss of milk production, reduction in calf crop, increased cost of treatment and culling of useful breeding animals leading to heavy economic losses to the dairy producers. Endometritis is one of the serious and common problems in dairy animals that may ultimately lead to infertility in cattle and thus, heavy economical loss may occur in dairy industry. Uterine infections particularly endometritis is one of the important reasons for infertility in bovines. The incidence of bovine endometritis varies from 15 to 57 %, [34] and the variability mainly depends on sanitation practiced during peripartum and immediate postpartum period. The other important reasons are unhygienic A.I., service by an infected bull and systemic infections. The bacterial contamination of the uterus during and immediate to parturition virtually occurs in all the cows and if the contamination worsen due to bacterial colonization it leads to endometritis [38]. Endometritis, particularly subclinical and it is the major cause

of repeat breeding [5]. Furthermore, it is bacterial endometritis that constitutes major concern especially in cross bred cattle. Periparturient complication like retained placenta, dystocia, twins, dead foetus, milk fever, etc., increases the risk of uterine infection because they delay involution and reduces the bovine ability to control uterine infections.

MATERIALS AND METHODS

Preparation of experimental Animal:

Gynaecological cases were screened to identify repeat breeder cows. The cases of endometritic repeat breeder cow which, were presented at veterinary hospitals lying adjacent to Kumarganj area (Khandasha) and Animal of villages in Vicinity of University were used for the study. The cervical mucus from these cows were collected at pre and post-treatment oestrus, visually examined and tested for change in colour, intensity to white side test and pH. The cases were also identified by using ultrasonography. In ultrasonography the endometrium is thick and copious mucous is present in uterus. The effect of different treatment on haematological and serum biochemical profile were also analysed.

Selection of repeat breeder cows affected with endometritis:

Forty (n=40) repeat breeder cow were selected for the study. The repeat breeder animals were confirmed by history, thorough per rectal examination and physico-chemical characteristics of cervical mucus. The animals with purulent or mucopurulent estrual discharge or containing white flakes and positive reaction to white side test [31] were considered as positive for endometritis. Moreover, animals with history of repeat breeding and clear discharge but positive to white side test were also be included in the present study.

The selected forty (n=40) repeat breeder cows were divided into five group, each comprising of eight (n=8) animals and eight (8) normal cyclic animals were also taken for study. The treatments were given as per following schedule.

Groups	Treatment protocols
G I	No treatment is given, served as control.
G II	Antibiotic Levofloxacin (60 ml) intrauterine daily for three days.
G III	25 g of Giloy satva orally. Daily for 10 day.
G IV	Crude Ashwagandha powder @ 25g/day orally, daily for 10 days.
G V	Equal amount of Giloy (25g) and Ashwagandha (25 g) for 10 days orally.

Collection of blood samples analysis of haematological parameters:

Blood Sample was collected two times (before and after treatment) during the whole experimental period. Approximately 10 ml of blood was collected aseptically from the jugular vein of each experimental animal in sterilized disposable syringe (16 gauge needle). The blood samples immediately used for analysis of haematological parameters haemoglobin (Hb), total leucocytes counts (TLC) and differential leukocyte count (DLC).

Determination of haemoglobin concentration in blood (Hb):

The haemoglobin concentration of blood was estimated by the method using Sahli's haemoglobinometer [35].

Determination of total leukocyte count (TLC):

Leucocytes/white blood cells were counted by the method of [35] using Haemocytometer.

Differential leucocytes count (DLC)

A thin blood film was made by spreading a blood drop evenly on clean grease free slide using smooth edged spreader. Modification of Romanowsky's stain [25] namely Leishman's stain was used. For Giemsa's staining the air dried blood smears were prefixed with acetone free methanol for 5 minutes. In general terms, 100 white blood cells should be counted and classified according to the morphologic and staining characteristics. Counting was usually carried out using a manual differential cell counter. The differential white blood cell count was expressed as a percentage of the individual cell group. The percentage of each cell group was then converted into absolute numbers by reference to the total WBC.

Erythrocyte sedimentation rate (ESR):

The distance (in mm) that the erythrocyte fall during a given period of time when blood to which anticoagulant has been added in a tube placed in a vertical position.

Packed cell volume (PCV):

The Packed Cell Volume (PCV) can be determined by centrifuging anti-coagulated blood in a capillary tube (also known as microhaematocrit tube) at 3000 RPM for 30 minutes. This separates the blood into

layers. The volume of Packed Red Blood Cells divided by the total volume of the blood sample gives the Packed Cell Volume (PCV).

Collection of blood samples for serum biochemical profile and storage:

Approximately 10 ml of blood was collected in a clean sterile glass test tube from jugular vein puncture using 16 G" sterilized needles from each repeat breeding cow and regular cycling cows. The tube was kept in slanting position away from sun light. The serum was separated and stored at -20^{0}C until analysis after keeping in sterilized vials. The serum was analysed for biochemical profile blood glucose, total protein, and mineral profile calcium and phosphorus by using standard kits.

Estimation of serum glucose:

Glucose was estimated with the help of Span Cogent Diagnostic Kit (Span diagnostics Ltd) by the method of Reitman and Frankel. This method has been standardized with Kinetic Method (Standard Karmen Unit assay). The OD was measured using spectrophotometer at 505 nm wave length, within 15 minutes against a blank reagent. Serum glucose (mg/dl) = OD of the test sample OD of the standard x Concentration of the standard (100 mg/dl).

Estimation of Total serum protein

Estimation of total proteins in serum samples was done by modified BIURET Method with the help of Span cogent diagnostics Kit. The optical density (OD) was measured using spectrophotometer at 578nm wave length against a blank reagent. Proteins, in alkaline medium, bind and cupric ions present in the biuret reagent to form a blue-violet coloured complex. The intensity of the colour formed was directly proportional to the amount of proteins present in the sample. Concentration of serum proteins was expressed in g/dl. Serum protein (g/dl) = OD of the test sample OD of the standard x Concentration of the standard (6.5 g/dl).

Estimation of Serum calcium, phosphorus:

Serum calcium and inorganic phosphorus concentrations were determined by using spectrophotometric method. Commercially available Span Cogent diagnostic kits, for calcium and inorganic phosphorus. The OD of serum calcium and inorganic phosphorus were measured using Spectrophotometer at 578 nm and 340 nm wave length, respectively. Concentration of calcium and inorganic phosphorus were expressed in mg/dl. Serum Calcium (mg/dl) = OD of the test sample OD of the standard x Concentration of the standard (10 mg/dl). Serum Phosphorus (mg/dl) = OD of the test sample OD of the standard x Concentration of the standard (5 mg/dl).

Statistical analysis:

The data obtained in this study were analysed by using suitable statistical methods [41].

RESULTS AND DISCUSSION

Repeat breeders are cows that are cycling normally without any clinical abnormalities, but fail to conceive even after at least three successive inseminations. They have clinically normal reproductive tract, oestrous cycles and oestrous periods.

The therapeutic study was carried out to evaluate therapeutic efficacy of antibiotic (Levofloxacin) and ethno-veterinary medicines (*Tinospora cordifolia*, *Withania somnifera* and its combination) on repeat breeder cow. The cervical mucus and blood sample were collected from affected animal at pre and post treatment oestrus. The blood sample was collected from affected animal at pre and post treatment oestrus. Effect of antibiotic and herbal treatment on haematological profile and pregnancy rate were evaluated and data were analysed experimentally and results of different parameter are bellow;

Serum Biochemical Profile of Repeat breeder cows:

Blood is of crucial importance for the maintenance of physiological equilibrium in the body. However, this equilibrium may be disturbed due to certain physiological and pathological conditions. The knowledge of haematological values is useful in diagnosing various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance of cows, resulting in great economic losses to dairy farmers [32]; [12]. Since blood profile changes during various reproductive states, it is imperative to study haematological constituents during these states. These changes in haematological constituents are important indicators of the physiological or pathological state of the animal. The mean value of the serum glucose, total protein, calcium and phosphorus of repeat breeder, post treated & cyclic cows was presented in (Table-1.1).

Serum glucose:

The mean concentration of serum glucose level (mg/dl) in untreated endometritic repeat breeder cow (BG1, BG2, BG3, BG4 and BG5 as 59.48±0.81, 59.71±0.72, 59.72±0.85, 60.01±0.54 and 61.05±0.65 respectively), in post treated cow (G1, G2, G3, G4 and G5 as 59.13±1.05, 53.96±2.03, 54.19±2.10, 55.86±1.90 & 54.19±2.10 respectively) and in normal cyclic cow (G0, 50.67±0.57) were summarized in

(Table- 1.1, Figure- 1.1). The results clearly indicates that serum glucose level of repeat breeder cow with endometritis significantly (P<0.05) higher than that of normal cyclic and treated respond cow. Similar result was also obtained by [22], [2] and [44]. In contrast to our result, [9] recorded higher glucose level in normal cyclic cow than repeat breeder cow.

Increased blood glucose level in endometritic animals may results from either an imbalance between hepatic output and peripheral uptake of the sugar or disturbance in the endocrine regulatory mechanism, which influence these processes. Abnormal functioning of hormone producing organs may influence glucose level .Increased activity of the anterior pituitary, adrenal cortex and thyroid may results in increased blood glucose level. Mechanism by which hyper pituitariesm resulted is incompletely understood. However, it may be related to increased production of adrenocorticotrophic hormone [10].

Ashwagandha was considered as adaptogenic which is a nontoxic herb that work on nonspecific basis to normalize physiological function working on the hypothalamus pituitary axis and the neuroendocrine system. Regular uses of Ashwagandha help to normalize blood sugar level**,** [43]. *Tinospora cordifolia* is also adaptogenic, normalize the blood glucose level and help to build up immune system and increase the resistance of body against infection [13].

Total serum proteins:

The mean concentration of total serum protein (g/dl) in endometritic repeat breeder cow, post treated cow and in normal cyclic cow BG1, G1, BG2, G2, BG3, G3, BG4, G4, BG5, G5 and G0 group were recorded as 18.95±0.40, 18.83±0.40, 18.57±0.25, 10.16±0.89, 18.05±0.21, 11.07±0.10, 18.41±0.25, 10.50±0.81, 18.52±0.29, 10.35±0.60 and 9.51±0.15, respectively (Table-1.1, Figure 1.2). This results clearly indicated that the serum total protein level of endometritic cow was significantly (p<0.05) higher than that of the normal cyclic and treated cow. Similar result was also obtained by [2] and [44]. In contrast to our result, [21], [15] and [3] recorded higher total protein level in normal cyclic cow than repeat breeder cow.

Similarly, total serum protein in normal cyclic cow was significantly (P<0.01) lower than that of repeat breeder animal. [22] and [20] also reported higher value of total protein in endometritis affected buffalo and cow as compared to cyclic buffalo & cow. However, [29] observed significantly higher value of serum total protein in cyclic cow. The variation could be due to difference in breeds, environment and level of nutrition. In agreement to the findings of the present study, higher level of total serum protein was associated with cow fertility, as reported by [17]. Excessive intake of protein in the feed can reduce fertility and degree in the number of services per conception. Fertility is impaired more by feeding excessive protein to older cows. The mechanism by which high level of protein adversely affects reproduction dairy cow is unknown [33].

Infection caused hypoalbuminemia 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, infection can lead to increased catabolic rate and redistribution of albumin from plasma to interstitial compartment [6]. This was one of reason to increase total protein level in affected animal. Ashwagandha treated animal expressed slightly high total protein level as compared to cyclic animal, but significantly lower than the infected control group which was similar to observation reported by [23].

Serum calcium:

Mean serum calcium level (mg/dl) in endometritic repeat breeder cow (BG1= 9.24±0.39, BG2= 8.61±0.13, BG3= 8.52±0.11, BG4= 8.39±0.12 & BG5= 8.41±0.32), in post treated cow (G1= 9.28±0.38, G2= 10.10±0.33, G3= 9.61±0.31, G4= 9.80±0.36 & G5= 9.95±0.32) and in regular cyclic cow (G0= 10.16±0.23) were summarized in Table- 1.1, figure- 1.3 .

The serum calcium levels were significantly higher in the fertile cow as compared to the repeat breeder cow. A low profile of calcium in the repeat breeder cow could be due to some metabolic disturbances causing poor absorption of calcium from gut. Since, calcium is required for neuromuscular excitability, muscles and transmission of nerve impulse at cellular level [39]. Synthesis of ovarian steroid is under the control of gonadotropic hormone in which calcium play a pivotal role [8]. Regulation of membrane potential of oocytes is also controlled by the calcium. Further, it also suggested that calcium is involved in regulation of gap junctions with respect to their number between cumulus cell resulting in disruption of cohesiveness of cumulus cell [30], which contribute to the process of ovulation. Calcium plays key part in improving the number and size of ovarian preovulatory follicle and the ovulation rate. The deficiency of calcium may results in reduces tone and contraction of uterine muscle, which ultimately prevent forward movement of sperm and ovum in the opposite direction, result in inhibition of zygote formation and subsequent fertilization.

Phosphorus:

The overall mean serum inorganic phosphorus in pre-treated, post treated and in regular cyclic cow in (mg/dl) was given in the (Table- 1.1, Figure- 1.4). Similar finding were also reported by [9], [18], [29], [3],

and [44]. The serum inorganic phosphorus concentration was significantly higher in cyclic and post-treated animal than in repeat breeder cow (Table- 1.3). Deficiency of phosphorus in particular, influences at the level of pituitary and ovary and may interfere with fertilization causing early embryonic death, there by produces aberrations in the normal reproductive rhythm since phosphorus is essential for transfer of biological energy especially through ATP. This hypothesis is supported by the fact through a possible relationship of low level of serum inorganic phosphorus in the occurrence of post partum repeat breeding in crossbred cows. Interestingly, low values of inorganic phosphorus could be due to some metabolic alterations in the plasma of repeat breeding cows fed under similar conditions, in the present study.

Disturbances in the ovulation along with pituitary-ovarian axis could cause by marginal deficiency of phosphorus. On the contrary, the excess of phosphorus renders the endometrium susceptible for infection whereas, moderate deficiency of phosphorus may leads to repeat breeding condition and poor conception rate [37].

Haematological profile of endometritic repeat breeder cow:

The mean value of the haemoglobin (Hb), packed cell volume (PCV), erythrocyte sedimentation rate (ESR), total leucocyte count (TLC), differential leucocyte count (DLC) in endometritic repeat breeder cow, treated cow and regular cyclic cow were summarized in (Table- 1.2)

Haemoglobin (Hb), packed cell volume (P.C.V.) and Erythrocytes sedimentation rate (E.S.R.):

The mean value of Hb and P.C.V. in BG1, G1, BG2, G2, BG3, G3, BG4, G4, BG5, G5 and G0 group were recorded as 11.38±0.10, 11.45±0.12 , 11.08±0.15, 12.38±0.21, 10.98±0.17, 12.00±0.21, 10.93±0.19, 11.83±0.14, 11.23±0.11, 12.15±0.20 and 12.00±0.14 g/dl and 31.95±0.19, 32.50±0.13, 32.08±0.22, 34.80±0.32, 32.30±0.13, 33.43±0.86, 32.38±0.13, 34.18±0.50, 32.50±0.13, 34.18±0.47 & 33.30±0.22 %, respectively, while mean value of E.S.R. measured as 8.28±0.10, 8.53±0.06, 8.28±0.10, 8.98±0.20, 8.24±0.13, 8.90±0.12, 8.36±0.14, 8.80±0.18, 8.26±0.14, 8.94±0.16 & 8.75±0.14 mm/24hr, respectively (Table- 1.2, Figure- 1.5, Figure- 1.6, Figure- 1.7).

The value of Hb, PCV and E.S.R in the present study were significantly ($P<0.05$) higher in the post treated and regular cyclic animal than the repeat breeding cattle. These findings were comparable with the observation of various researchers [1]; [16]; [24] and [44]. Lower haemoglobin indicates anaemic and its values are significantly lower in all problematic groups as compared to cyclic cows. The cows in the present study were the outpatients at the veterinary hospital and may have been suffering from gastrointestinal parasites causing anaemia and hypoproteinamia [26].

Tissue oxygenation of reproductive tract & turn in the normal cyclicity is dependent on the haemoglobin level in the circulation. During oestrus, sufficient concentration of haemoglobin in blood is required for the proper transportation of oxygen and nutrients to the vital organs, as same nutrients are required for metabolic activities of the gonadal cells. Hence, low haemoglobin level could be cause for repeat breeding of cattle in the present study. The trend of variation in PCV was found to be similar to be the value of Hb and ESR in both cattle & buffaloes. Similar finding was also reported by [4]) and [44].

The Hb, PCV and ESR values in post treated animals were similar to the cyclic animal. This recovery might be due to antimicrobial property of levofloxacin and Ethno-veterinary medicine like Giloy, Ashwandha and its combination. The ethno-veterinary medicines are effective in the treatment of uterine infection by its properties to regulate hormonal rhythm of the body, which reflect to maintain homeostasis. Ashwagandha and Giloy improves the haemoglobin level, its increase the mean corpuscular haemoglobin concentration, R.B.C. count and stimulate cytotoxic T lymphocytes act as immune stimulant in patient.

Total Leucocytic count (T.L.C.):

The overall mean value of TLC (mean±S.E.) in BG1, G1, BG2, G2, BG3, G3, BG4, G4, BG5, G5 & G0 group were recorded as 12390±349.70, 12428±360.20 ,12480±216.00, 10186±634.30, 12394±227.50, 10380±552.80, 12789±203.20, 11653±458.60, 12936±294.10, 11633±417.60 & 10560±174.30 per µL, respectively (Table- 1.2, Figure- 1.8).

T.L.C. value were significantly (<0.05) higher in endometritic affected repeat breeder cows. Due to infection in the body the leucocytic count is higher. The degree of leucocytosis depends upon several factors including nature of the causative agents, severity of infection and resistance of animals and localization of inflammatory response. In the present observation non significant changes in TLC count and neutrophil count in *Withania somnifera* treated group compared with the control but significantly decreased when compared with infected untreated one that might be due to antibacterial effect.

Differential leukocytes count (D.L.C.):

The overall mean value of neutrophils in pre-treated animal in BG1, BG2, BG3, BG4, BG5 were observed as 30.50±0.87, 31.13±0.77, 31.25±0.59, 31.50±0.42, 31.88±0.58 whereas, lower value of neutrohpil were recorded as 30.25±0.92, 24.88±0.44, 27.63±0.53, 27.50±0.42, 28.13±0.64 in treated animal of group G1,

G2, G3, G4, G5 respectively whereas, mean value of lymphocytes in endometritic repeat breeding cows were recorded as 60.00±0.96, 59.25±0.98, 59.50±1.09, 59.50±0.80, 58.75±1.08 in group BG1, BG2, BG3, BG4, BG5 respectively that value were higher in post treated and regular cyclic cows were observed as 59.38±0.68, 62.63±0.32, 61.00±0.57, 61.63±0.65, 59.00±1.01 & 61.88±0.52 in a group G1, G2, G3, G4, G5 & G0 respectively (Table- 1.3, Figure- 1.9, Figure- 1.10, Figure- 1.11, Figure- 1.12, Figure- 1.13). In present finding, the mean value of eosinophils and basophils were not significantly differed between endometritic repeat breeder cow & normal cyclic cow. However neutrophils, lymphocytes and monocytes value between repeat breeder cow and cyclic cow were significantly differed in present study. Thus the results indicate that the basophil and eosinophil value could not be used as marker to identify repeat breeder in herd.

Deferential leucocyte count revealed that neutrophils were significantly higher in endometritic cow than in cyclic cow. Leucocytosis induced as a result of infection which inhance the release of neutrophils from bone marrow through leucocytosis-inducing factors (LIF) of the plasma. Concentration of LIF is increased in bacterial disease by bacterial product hence, leucocytosis (Neutrophil) occurs in such diseased condition [36]. In state of excitement, exercise and strange surroundings, there is also leucocytosis (neutrophil). Since adrenaline liberated during these states, mobilizes the marginal neutrophils pool cell [36]. [42] reported a significant increase in RBC and WBC during oestrus phase in cattle. [11] and [27] reported lower level of haemoglobin in anoestrus than in cycling buffaloes and cows, respectively. [45] recorded higher haemoglobin values, erythropemia and leucocytosis with neutrophilia, basophelia and lymphocytopenia in endometritic cows. [19] observed lower values of total erythrocyte count, haemoglobin concentration and PCV in anoestrus and repeat breeder animals while mean corpuscular volume and total leukocyte count were increased in these two groups.

Organisms that cause postpartum uterine infections are usually sensitive to penicillin, but bacterial contamination during the first several weeks after calving produce penicillinase, which renders the drug ineffective if applied locally. By 30 days postpartum these organisms are usually eliminated, and intrauterine treatment with penicillin is more likely to be effective after that time [28]. However, these therapies involve high cost of treatment, inconsistent results, milk disposal and several other side effects. Use of certain immunomodulator substance, as alternative therapeutic agents have becomes a subject of recent scientific investigation. *Tinospora Cordifolia*, an indigenous plant used in Ayurveda is known for its immunopotentiating action, and has been shown to have beneficial effect in burns, ulcer, cancer etc. and mastitis in cattle [40].

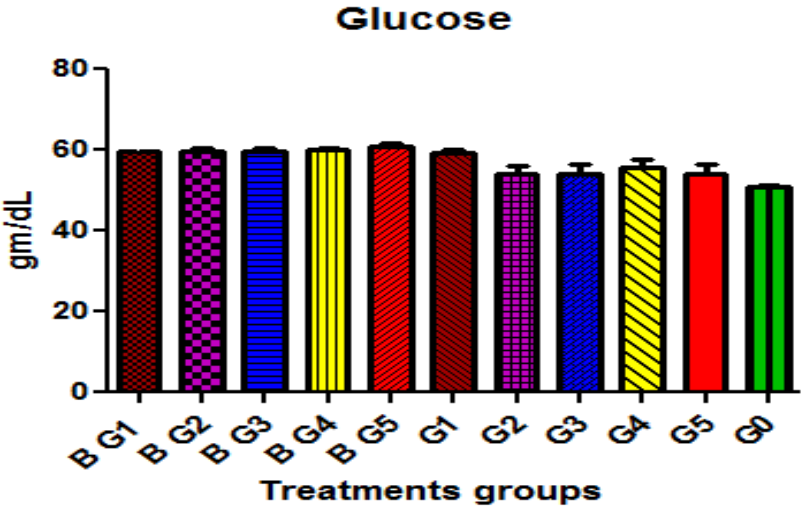

Figure-1.1: Graphical representation of total serum glucose values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, withania somnifera* and combination of both (BG is before treatment and G is after treatment).

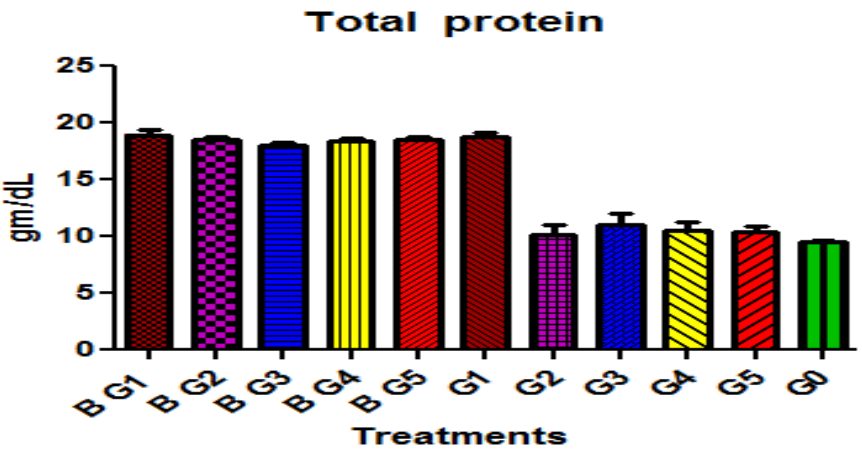

Figure-1.2: Graphical representation of total serum protein values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, withania somnifera* and its combination (BG is before treatment and G is after treatment).

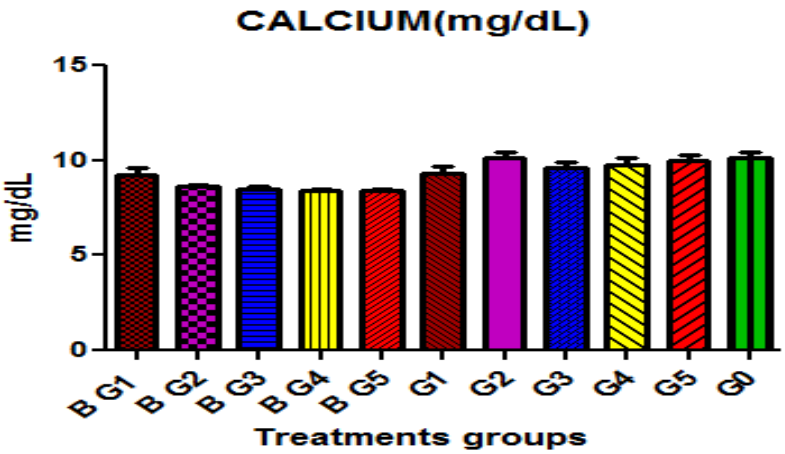

Figure 1.3: Graphical representation of total serum calcium values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, Withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

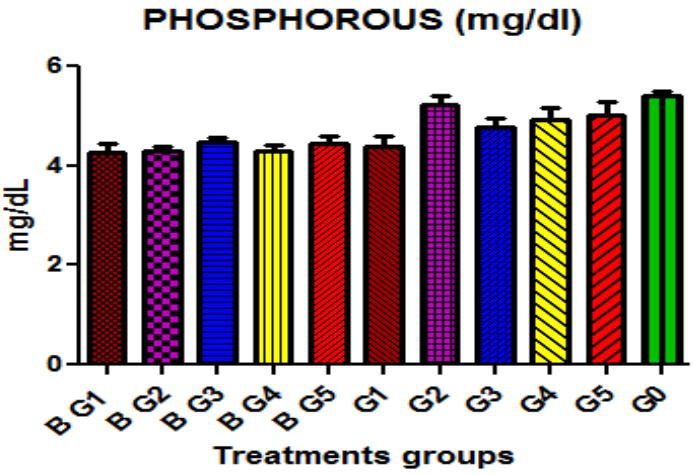

Figure 1.4: Graphical representation of total serum phosphorus values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

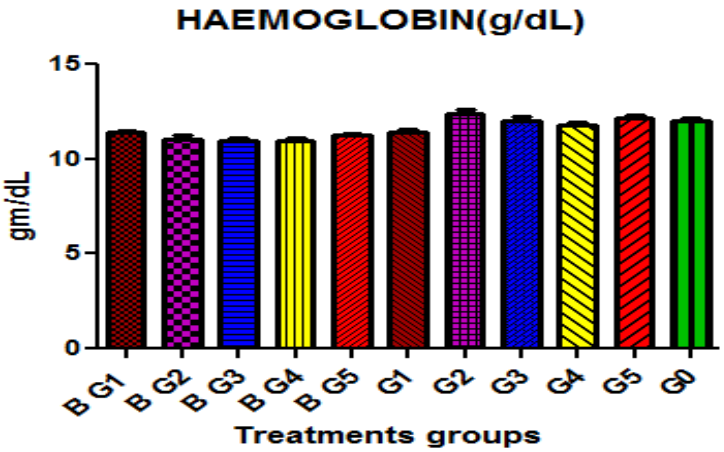

Figure 1.5: Graphical representation of Haemoglobin values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, Withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

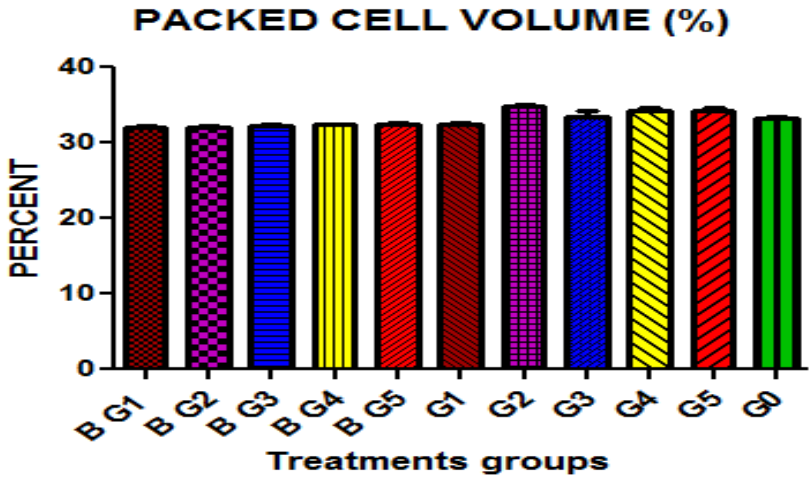

Figure 1.6: Graphical representation of Packed cell volume values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia*, *Withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

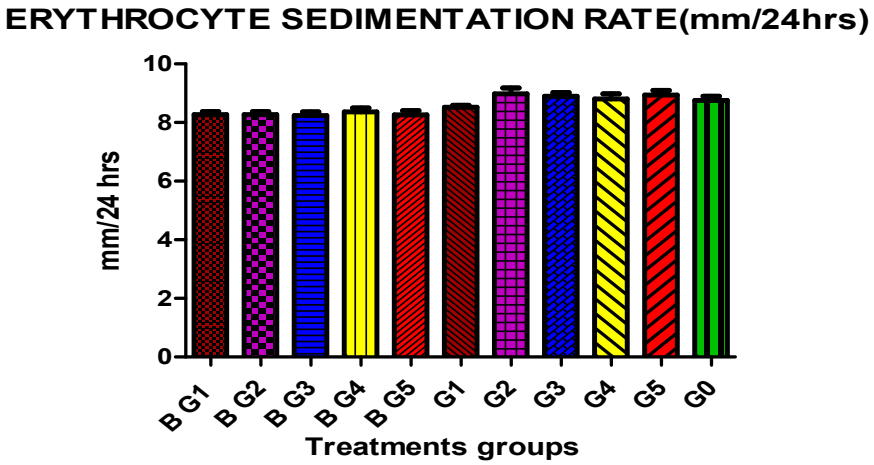

Figure-1.7: Graphical representation of Erythrocytes sedimentation rate values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Levofloxacin, *Tinospora cordifolia, withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

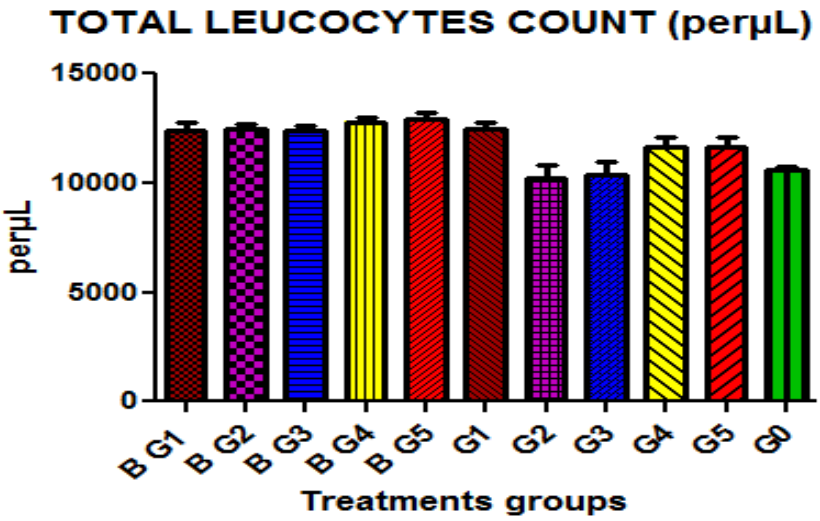

Figure 1.8: Graphical representation of Total leucocytes count values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, Tinospora cordifolia, withania somnifera and combination of both (BG is before treatment and G is after Treatment).

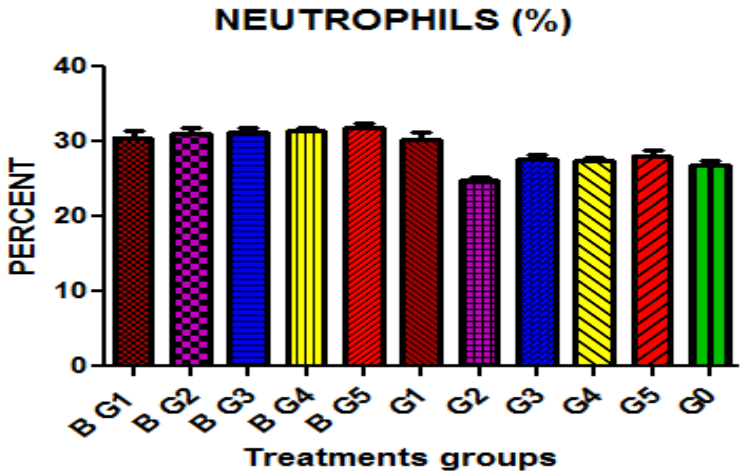

Figure 1.9: Graphical representation of Neutrophils values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, Tinospora cordifolia, withania somnifera and combination of both (BG is before treatment and G is after Treatment).

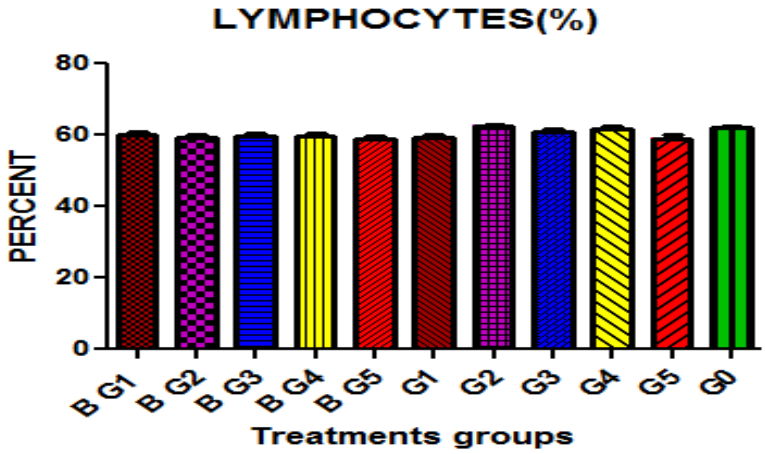

Figure 1.10: Graphical representation of Lymphocytes values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, *Tinospora cordifolia, Withania somnifera* and combination of both (BG is before treatment and G is after Treatment).

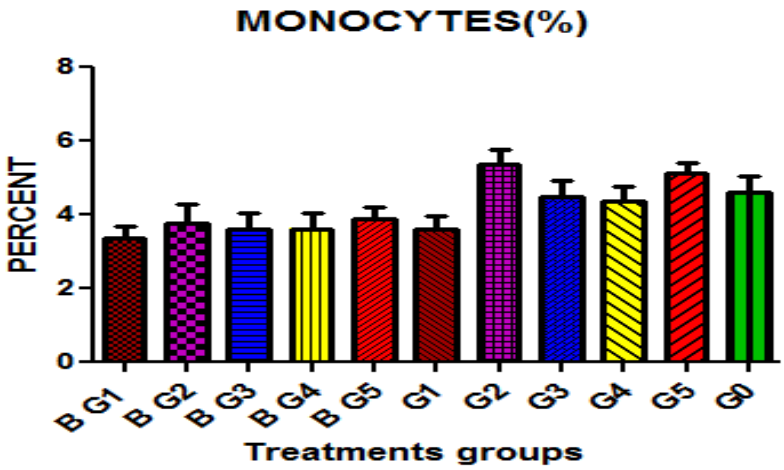

Figure 1.11: Graphical representation of Monocytes values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, Tinospora cordifolia, Withania somnifera and combination of both (BG is before treatment and G is after Treatment).

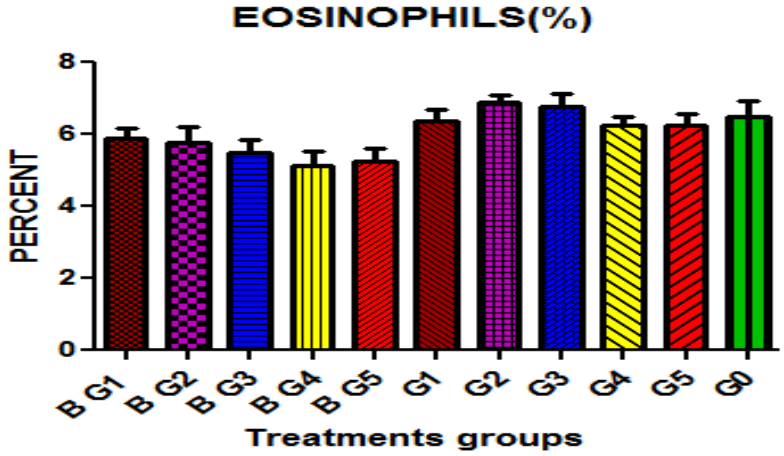

Figure 1.12: Graphical representation of Eosinophils values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, Tinospora cordifolia, withania somnifera and combination of both (BG is before treatment and G is after Treatment).

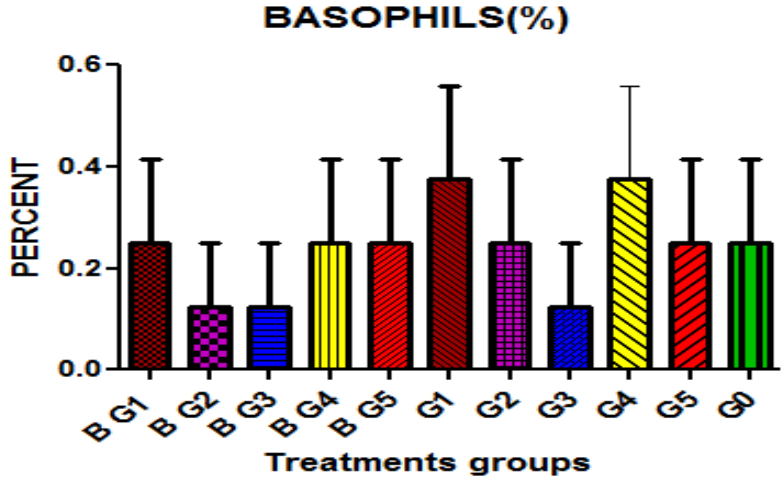

Figure 1.13: Graphical representation of Basophils values (Mean±S.E) in Endometritic repeat breeding, treated and cyclic cow with Antibiotic, Tinospora cordifolia, withania somnifera and combination of both (BG is before treatment and G is after Treatment).

Table 1.1: Effect of Antibiotic (Levofloxacin) and Herbal drugs (*Tinospora cordifolia,Withania somnifera* and its combination) on Serum biochemical constituents (mean±S.E.) in endometritis affected repeat Breeder cow

Parameters	Status	Treatments					
		G1	**G2**	**G3**	**G4**	**G5**	**GC**
Total Protein	Before Treatment	18.95±0.40^{X}	18.57±0.25^{A,X}	18.05±0.21^{A}	18.41±0.25^{X}	18.52±0.29^{X}	9.51±0.15^{Y}
	After treatment	18.83±0.40^{a,X}	10.16±0.89^{B,} ^{bcde}	11.07±0.10^{B,} ^{bcde}	10.50±0.81^{B,} ^{bcde}	10.35±0.60$^{B,\ bcde}$	
Glucose	Before Treatment	59.48±0.81^{X}	59.71±0.72^{A,X}	59.72±0.85^{A,X}	60.01±0.54^{X}	61.05±0.65^{A,X}	50.67±0.57^{Y}
	After treatment	59.13±1.05^{a}	53.96±2.03^{B,ab}	54.19±2.10^{B,abc}	55.86±1.90^{abcd}	54.19±2.10^{B,abcde}	
Calcium	Before Treatment	9.24±0.39	8.61±0.13^{A}	8.52±0.11$^{A,\ X}$	8.39±0.12$^{A,\ X}$	8.41±0.32$^{A,\ X}$	10.16±0.23^{Y}
	After treatment	9.28±0.38^{a}	10.10±0.33^{B,ab}	9.61±0.31^{B,abc}	9.80±0.36^{B,abcd}	9.95±0.32^{B,abcde}	
Phosphorus	Before Treatment	4.27±0.17^{X}	4.28±0.09^{A,X}	4.49±0.09	4.30±0.11^{A,X}	4.45±0.14^{X}	5.39±0.11^{Y}
	After treatment	4.40±0.20^{a,X}	5.21±0.19^{B,ab}	4.78±0.16^{abc}	4.94±0.22^{B,abcd}	5.02±0.26^{abcde}	

Mean bearing different superscript in the column (A, B) and in a row (a, b, c, d, e) significantly differed repeatedly for each attributes.

Table 1:2 Effect of Antibiotic (Levofloxacin) and Herbal drugs (*Tinospora cordifolia,Withania somnifera* and its combination) on haematological changes constituents (mean±S.E.) in endometritis affected repeat Breeder cow

Parameters	Status	Treatments					
		G1	G2	G3	G4	G5	G0
Hb	Before Treatment	11.38±0.10	11.08±0.15^{A,X}	10.98±0.17^{A,X}	10.93±0.19^{A,X}	11.23±0.11^{A}	12.00±0.14^{Y}
	After treatment	11.45±0.12^{a}	12.38±0.21^{B,b}	12.00±0.21^{B,abc}	11.83±0.14 ^{B,abcd}	12.15±0.20 ^{B,abcde}	
TLC	Before Treatment	12390±349.70^{X}	12480±216.00^{A}	12394±227.50 ^{A}	12789±203.20 ^{A,X}	12936±294.10 ^{A,X}	10560±174.3 ^{Y}
	After treatment	12428±360.20^{a}	10186±634.30^{B,b}	10380±552.80 ^{B,bc}	11653±458.60 ^{B,abcd}	11633±417.60 ^{B,abcde}	
PCV	Before Treatment	31.95±0.19^{A,X}	32.08±0.22^{A,X}	32.30±0.13^{A}	32.38±0.13^{A}	32.50±0.13^{A}	33.30±0.22^{Y}
	After treatment	32.50±0.13^{B,a}	34.80±0.32^{B,b}	33.43±0.86^{B,abc}	34.18±0.50 ^{B,abcd}	34.18±0.47 ^{B,abcde}	
ESR	Before Treatment	8.28±0.10	8.28±0.10^{A}	8.24±0.13^{A}	8.36±0.14^{A}	8.26±0.14^{A}	8.75±0.14^{Y}
	After treatment	8.53±0.06^{a}	8.98±0.20^{B,ab}	8.90±0.12^{B,abc}	8.80±0.18^{B,abcd}	8.94±0.16^{B,abcde}	

Mean bearing different superscript in the column (A, B) and in a row (a, b, c, d, e) significantly differed repeatedly for each attributes.

Table 1.3: Effect of Antibiotic (Levofloxacin) and Herbal drugs (*Tinospora cordifolia, Withania somnifera* and its combination) on differential leucocytes count (mean±S.E.) in endometritis affected repeat Breeder cow

Parameters	Status	Treatments					
		G1	G2	G3	G4	G5	G0
Neutrophil	Before Treatment	30.50±0.87	31.13±0.77^{A,X}	31.25±0.59^{A,X}	31.50±0.42^{A,X}	31.88±0.58^{A,X}	26.75±1.67^{Y}
	After treatment	30.25±0.92^{a}	24.88±0.44^{B,b}	27.63±0.53 ^{B,abc}	27.50±0.42 ^{B,abcd}	28.13±0.64 ^{B,abcde}	
Lymphocytes	Before Treatment	60.00±0.96	59.25±0.98^{A}	59.50±1.09	59.50±0.80	58.75±1.08	61.88±0.52^{Y}
	After treatment	59.38±0.68^{a}	62.63±0.32^{B,b}	61.00±0.57^{abc}	61.63±0.65^{abcd}	59.00±1.01^{acde}	
Monocytes	Before Treatment	3.38±0.32	3.75±0.53^{A}	3.63±0.42	3.63±0.42	3.88±0.35^{A}	4.63±0.42^{Y}
	After treatment	3.63±0.32^{a}	5.38±0.38^{B,b}	4.50±0.42^{abc}	4.38±0.38^{abcd}	5.13±0.30$^{B,\ abcde}$	
Eosinophile	Before Treatment	5.88±0.30	5.75±0.45	5.50±0.33^{A}	5.13±0.40^{A}	5.25±0.37	6.50±0.42^{Y}
	After treatment	6.38±0.32^{a}	6.88±0.23^{ab}	6.75±0.37^{B,abc}	6.25±0.25^{B,abcd}	6.25±0.31^{abcde}	
Basophile	Before Treatment	0.25±0.16	0.13±0.13	0.13±0.13	0.25±0.16	0.25±0.16	0.25±0.16^{Y}
	After treatment	0.38±0.18^{a}	0.25±0.16^{ab}	0.13±0.13^{abc}	0.38±0.18^{abcd}	0.25±0.16^{abcde}	

Mean bearing different superscript in the column (A, B) and in a row (a, b, c, d, e) significantly differed repeatedly for each attributes.

CONCLUSION

- In the present study compare the therapeutic efficacy of antibiotic and herbal medicines in the treatment of repeat breeder cows with endometritis.
- Biochemical and haematological profile were differed significantly between cyclic and repeat breeder cow. So that these parameters may be helpful in the diagnosis of repeat breeder cows with endometritis.
- Overall recovery rate and conception rate was recorded as 87.50% and 75% for levofloxacin, 75% and 50% for Giloy, 50% and 37.50% for Ashwagandha and 75% and 50% for combination of Giloy and Ashwagandha treated group.
- Based on present finding it is concluded that levofloxacin and herbal medicine (*Tinospora cordifolia, Withania somnifera* & its combination), have effective to control of endometritis affected repeat breeder cows and levofloxacin is more effective to control endometritic repeat breeder cows.
- *Tinospora cordifolia, Withania somnifera* and its combination can utilize as low cost remedy for therapeutic management of endometritis affected repeat breeder cows.

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