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Evaluation of haematological parameters treated with moxifloxacin on uterine infection in bovines

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Abstract

Aim: The aim of this study is to evaluate haematological parameters in uterine-infected cows treated with Moxifloxacin.

Material and Methods: The study was conducted with 6 cows (24-36 months of age, weighing 250 – 300 Kg) on were selected for the study on the basis of white flakes or cloudy discharge from vagina on the day of estrus considered as uterine infection. Prior to the commencement of experiment, the animals will be ensured that they had no history of antibacterial and/or NSAID treatment. Moxifloxacin (Moxiwell® equivalent to 100 mg/ml Moxifloxacin, Welcome., India) was administered separately in each of six uterine-infected cows by intra-uterine (IU) route daily for next five days Blood samples and smears were collected and prepared on daily basis for five days during the treatment days was used to evaluate haematology parameters like Hb (g/dl), PCV (%), TLC ($10^3/\mu\text{l}$), Differential leukocyte count (%) and PMN cells were analyzed. All the data were statistically analyzed using SPSS 21.0 (SPSS Inc., Chicago) using one-way.

Results: The increase trend in Haemoglobin from Day 1 to Day 5 might showing the reduction in infection. PCV values in the present study start to rise with the treatment might be indicative of a reduction in the degree of infection and thus increasing values. TLC values after treatment of sub-clinical endometritis significantly decline. The mean PMNs on the 1st day of treatment there was a significant ($p<0.05$) decline in PMNs (%) subsequent post-treatment on next four days which is indicative of recovery from uterine infection by the use of moxifloxacin through the intra uterine route.

Conclusion: It was concluded that the level of Hb (g/dl), PCV (%), TLC ($10^3/\mu\text{l}$), Differential leukocyte count (%), and PMN (%) shows a positive effect of moxifloxacin through intrauterine route on the uterine infection.

Keywords: Cows, endometritis, moxifloxacin, uterine infection, haematological parameters

Introduction

Endometritis is the inflammation of the endometrium, which is the lining of the mucous membrane of uterus [2]. This is because the vagina is a host to numerous microorganisms where the opportunistic pathogens may invade the uterus during coitus or during postpartum period where the cervix is dilated. Within days or weeks, a healthy uterus is able to clear off the transient infections; however, persistent infections will lead to clinical endometritis which has a detrimental effect on fertility [7].

Uterine infections in dairy animals cause infertility in acute cases and sub-fertility in chronic cases. There are clinical signs of endometritis such as pus flakes and discharge of mucus from the cervicovaginal area, as well as changes in the haematological parameters, which most likely result from inflammatory cytokines produced. It is important for the resolution of induced inflammation that cytokines play a crucial role in modulating local and systemic inflammatory responses [5]. The acute phase response is induced primarily by cytokines IL-1, IL-6, and TNF α (Jensen and Whitehead 1998). As a result of their direct toxic effects on erythroid precursors as well as their decreased expression of hematopoietic factors such as erythropoietin, stem cell factors, and erythropoietin receptors, inflammatory cytokines inhibit erythropoiesis. Ruminants often experience neutrophilia following mild or moderate inflammation and more severe inflammation after the acute stage. In ruminants, lymphocytosis is rare; however, chronic inflammatory conditions may cause increased lymphocyte counts [3].

A normal puerperium causes more PMN impairment than an abnormal one. However diagnosis with haematological parameters (Hb (g/dl), PCV (%), TLC ($10^3/\mu\text{l}$), Differential leukocyte count %, and PMN %) and history of animal along with considering the therapeutic approach to the uterine infection consequently reduces the uterine infection [8].

Materials and Methods

The work was conducted in the Department of Veterinary Pharmacology and Toxicology, College of Veterinary Science and Animal Husbandry, Rewa (M.P.). Six uterine-infected cows, between 24 to 36 months of age and 250-300 kg body weight were selected for the study. Animals showing flakes of pus or cloudy discharge from the vagina as cervicovaginal mucus discharge on the day of estrus was considered suffering from uterine infection. Prior to the commencement of experiment, the animals will be ensured that they had no

history of antibacterial and/or NSAIDs treatment. An injectable Moxifloxacin (Moxiwell® equivalent to 100 mg/ml Moxifloxacin, Welcome., India) was administered separately in each of six uterine-infected cows by intrauterine (IU) route daily for next five days. Blood samples and smears were collected and prepared on daily basis for five days during the treatment days was used to evaluate haematological parameters like Hb (g/dl), PCV (%), TLC ($10^3/\mu\text{l}$), Differential leukocyte count (%) and PMN cells

Statistical analysis

All the data were statistically analyzed using SPSS 21.0 (SPSS Inc., Chicago) using one-way analysis of variance and significant means were compared using Duncan's multiple range test.

Results and Discussion

Table 1: Mean \pm S.E. value of haematological parameters treated with moxifloxacin on uterine infection in Bovines

| Day | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
|------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Hb | 8.99 ^A \pm 0.38 | 9.73 ^A \pm 0.55 | 10.80 ^A \pm 0.46 | 11.81 ^B \pm 0.40 | 11.84 ^B \pm 0.27 |
| PCV | 34.06 ^A \pm 0.42 | 34.71 ^A \pm 0.60 | 36.02 ^A \pm 0.53 | 37.01 ^B \pm 0.69 | 38.08 ^B \pm 0.63 |
| TLC | 12.22 ^B \pm 0.21 | 12.01 ^B \pm 0.19 | 9.32 ^A \pm 0.25 | 9.24 ^A \pm 0.20 | 9.10 ^A \pm 0.20 |
| Neutrophil | 45.57 ^B \pm 0.74 | 42.79 ^B \pm 0.66 | 27.83 ^A \pm 0.35 | 26.82 ^A \pm 0.42 | 27.19 ^A \pm 0.41 |
| Lymphocyte | 47.91 ^A \pm 0.97 | 55.23 ^A \pm 0.51 | 62.83 ^A \pm 0.83 | 63.13 ^B \pm 0.45 | 62.70 ^B \pm 0.54 |
| Basophil | 0.75 \pm 0.07 | 0.68 \pm 0.06 | 0.89 \pm 0.03 | 0.69 \pm 0.05 | 0.73 \pm 0.03 |
| Eosinophil | 2.14 \pm 0.26 | 2.47 \pm 0.24 | 1.96 \pm 0.32 | 2.32 \pm 0.30 | 2.94 \pm 0.15 |
| Monocyte | 0.92 \pm 0.23 | 0.58 \pm 0.18 | 0.91 \pm 0.08 | 1.59 \pm 0.13 | 1.29 \pm 0.24 |

Means bearing different superscripts (capital letters in row) differ significantly ($p < 0.05$).

Hemoglobin

The increase trend in Haemoglobin from Day 1 to Day 5 might be showing the reduction in infection. The values of Hb reflect the general health of animals. The Hb values in blood in normal healthy cows would be within the range of 8-15 g/dl [1].

PCV

PCV values in the present study start to rise with the treatment might be indicative of a reduction in the degree of infection and thus increasing values.

TLC

There is decreasing trend in TLC count from day 1 to day 5 of the treatment which is indicative of good effect of intra-

uterine moxifloxacin on endometritis in bovines [4]. Observed significant decline in TLC values after treatment of sub-clinical endometritis.

Neutrophils

A significant ($p < 0.05$) decrease was observed from day 3 onwards which shows hilarious effect of moxifloxacin on the uterine infection.

Lymphocytes

A significant ($p < 0.05$) increase was observed from day 3 onwards which might be due to the elimination of infection with the advancement of infection. Thus, eliminating the causative organism with increased lymphocytes in the blood.

Table 2: Mean \pm S.E. value of PMN cells treated with moxifloxacin on uterine infection in Bovines

| Group | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
|---------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|
| Group 1 | 9.66 \pm 0.35 ^A | 5.91 \pm 0.14 ^B | 2.25 \pm 0.21 ^C | 2.5 \pm 0.15 ^C | 2.41 \pm 0.19 ^C |

Means bearing different superscripts (capital letters in row) differ significantly ($p < 0.05$).

The mean PMNs (%) were 9.66 \pm 0.35 on the day 1 of treatment. There was a significant ($p < 0.05$) decline in PMNs (%) subsequent post-treatment on next four days which is indicative of recovery from infection.

Conclusion

It was concluded that uterine infection is a frequent cause of repeat breeding in cows and can be diagnosed by PMN cell's appearance of uterine luminal fluid and/or increased endometrial thickness. Cows with uterine infection can be successfully treated with an intrauterine infusion of 2000 mg of Moxifloxacin for 3-5 days.

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Competing Interests

The authors declare that they have no competing interests.

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