HISTOLOGICAL AND CYTOLOGICAL CHANGES IN UTERUS AND CONCEPTION RATE IN POSTPARTUM COWS WITH METHYL ERGOMETRINE MALEATE

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Abstract: On day 2 Postpartum 18 Holstein Friesian crossbred cows were divided equally into 2 groups as group I (treatment) and II (control), and were treated intramuscularly with 5 mg of methyl ergometrine maleate and 5 ml of normal saline respectively. In group I cows on day 10 postpartum, the endometrium showed involution process with mild neutrophilic and mononuclear infiltration. The mucin secretion was also noticed. On day 30 postpartum, group I cows had increased glandular activity with extensive lymphocytic infiltration and increased vascular spaces. There was a reduction in percentages of PMN cells and increase in lymphocytes in treated group from day 2 to day 30 postpartum. The first service, second service and overall first and second service conception rates were 11.11, 33.33 and 44.44 and 11.11, 22.22 and 33.33 in group I and II, respectively. From this study, it is concluded that injection of methyl ergometrine maleate during immediate postpartum period resulted in increased conception rate in Holstein Friesian crossbred cows.

Key words: Methyl ergometrine maleate, Cows, Conception rate,

INTRODUCTION

Puerperal uterine soundness is essential for the re-establishment of postpartum ovarian cyclicity and next pregnancy [1]. Delay in the completion of uterine involution and resumption of ovarian activity decreases the reproductive efficiency in cows [2]. The uterine tonic drug has been used for quick involution of uterus [3]. Roberts [4] opined that postpartum administration of 1–3 mg of ergonovine or other ergot products produced more prolonged rate of uterine contractions than oxytocin in cows. In buffaloes, methyl ergometrine maleate produced firm prolonged contraction of the endometrium that lasts for 3 – 4 hours followed by gradual relaxation over a period of 1.5 hours [5]. Although methyl ergometrine maleate have been administered to promote uterine involution in early postpartum cows, detailed reports on its effect on cytological and histological changes of uterus and subsequent conception following oestrus induction with CIDR have not been reported. Hence, the present study was designed to study the effect of methyl ergometrine maleate on the postpartum uterine involution through cytological and histological changes of uterus and subsequent conception rate following timed AI in Holstein Friesian crossbred cows.

MATERIALS AND METHODS

A total of 18 Holstein Friesian crossbred cows aged between 2nd and 5th lactations were selected and randomly and equally divided into 2 groups viz., group I (experiment) and II (control) consisting of 9 cows in each group. On day 2 postpartum, cows of group I were administered with an intramuscular
injection of 5 mg methyl ergometrine maleate (5 ml, Utrasafe®, Vet Mankind, New Delhi, India) and group II were injected with intramuscularly 5 ml normal saline (Parental drugs (India) limited, Indore, Madhya Pradesh, India). Endometrial biopsy was taken using Albuchin’s uterine biopsy catheter from the experimental and control cows on (i) day 10 and (ii) day 30 postpartum as per the technique followed by Palanisamy [6] with slight modifications. A piece of endometrium was released from the cutting edge of the catheter into a vial containing Bouin’s fluid and stored for 24 hours and processed by routine paraffin technique and stained with haematoxylin and eosin [7]. To study the cytology of uterus in group I and II cows, on day 2, 10, 20 and 30 postpartum about 60 ml of 0.9 per cent sodium chloride solution was infused into the uterus using 52 cm disposable plastic sheath kept at the body of the uterus. After infusion, the uterus was massaged gently and fluid was recovered by negative pressure aspiration into the syringe. The collected samples were brought to the laboratory within 2 hours and centrifuged at 1000 rpm for 5 minutes. The supernatant fluid was discarded and a small drop of sediment was streaked on to a clean, grease free glass slide and air dried. All the slides were fixed with methanol and stained with modified Giemsa stain for 20 minutes [8] and the cells were counted and percentages of differential count were recorded [9]. All the cows were inserted with Controlled Internal Drug Release device (CIDR, EAZI – BREED, Pfizer Animal Health Ltd, India) on day 45-55 postpartum intra-vaginally and left in situ for 9 days. All the cows had received an intramuscular injection of 25 mg of PGF2α (5 ml, Lutalyse®, Pfizer Animal Health Ltd, India) 24 hours before the withdrawal of CIDR. At 48 and 72 hours of CIDR withdrawal, timed artificial insemination (TAI) using frozen thawed good quality semen was performed to all the cows were examined rectally at 60 days after AI to diagnose pregnancy.

**Statistical analysis:** The data was analyzed statistically as per method described by Snedecor and Cochran [10].

**RESULTS AND DISCUSSION**

In the control cows, on day 10 postpartum, mild mononuclear infiltration and congestion in the endometrium along with few neutrophils was observed on the histopathology and on day 30 postpartum endometrial glandular proliferations with few neutrophils infiltration was noticed (Fig.1). In experimental cows on day 10 postpartum, the endometrium showed involution process, with mild neutrophilic and mononuclear infiltration with increased endometrial glandular activity. These regenerative changes of endometrium on day 10 postpartum were prominent in experimental group than control group. On day 30 postpartum, treated cows had increased glandular activity with extensive lymphocytic infiltration and increased vascular spaces in the endometrium along with mucin secretion (Fig. 2). When compared to day 10 postpartum, the regenerative changes of epithelium and endometrial glandular activities were predominant on day 30 postpartum in experimental groups. These observations were in accordance with the findings of Prasad and Krishna [11] in normally calved postpartum cows. The variation found in the histology of endometrium between treatment and control cows clearly reflected increased conception rate in treated group. In this experiment, the number of PMN cells were higher on day 2 postpartum than on day 10 postpartum (Table 1) in treatment and control groups. The cellular defense in uterus against bacterial contamination was provided by uterine leucocytes [12], believed to be migrated from the peripheral circulation. PMNs were the predominant inflammatory cell types found in the uterine fluid [13]. In this investigation, the fully dilated cervix at the time of parturition might have caused entry of bacteria into the uterus and this might have increased the PMNs on day 2 postpartum. Administration of methyl ergometrine maleate might have caused the uterine contractibility and expelled the lochia along with bacterial contaminants in treated cows. Hence, PMN influx into the uterus got reduced after the administration of the drug as suggested by Uthai et al. [14]. In this study, the mean number of PMN cells showed drastic decreasing trend from day 2 to day 30 postpartum in the treatment group than control cows (Table 1).

The first service, second service and overall first and second service conception rates following oestrus induction in the treatment and control groups were 11.11, 33.33 and 44.44 and 11.11, 22.22 and 33.33 in experimental and control groups, respectively. The first service conception rate was equal in both groups whereas the second service conception rates was higher in experimental than control group. The overall first and second service conception rate was highest in experimental than control group.
Fig. 1: Day 10 postpartum - Control cows with mild mononuclear infiltration and congestion in the endometrium along with few neutrophils. 
Fig. 2: Day 30 postpartum - Control cows with endometrial glandular proliferations with few neutrophils infiltration. 
Fig. 3: Day 10 postpartum - Treatment cows endometrium showed involution process, with mild neutrophilic and mononuclear infiltration with increased endometrial glandular activity. 
Fig. 4: Day 30 postpartum - Treatment cows with increased glandular activity with extensive lymphocytic infiltration and increased vascular spaces in the endometrium along with mucin secretion.
In the present study, reduction in mean number of PMN cells and increase in mean lymphocytes was observed. Bonnett et al. [15] opined that an increase segmented neutrophils (or PMN) in the endometrium was associated with poor reproductive performance whereas the presence of lymphocytes in the endometrium could be associated with good fertility. Ramoun et al. [16] proved the enhancement of uterine involution due to the prolonged ecbolic effect of methyl ergometrine maleate in the uterus of buffaloes. Roberts [4] reported that methyl ergometrine maleate might produce frim, prolonged contraction of uterus that lasts for 3 to 4 hours by a gradual relaxation over the period of 1.5 hours, which might lead to expulsion of lochia / uterine secretion. These might be the reasons for the enhanced conception rate obtained in treatment group than control group. Further this was also coincided by the decreased PMNS cells and increased lymphocyte as noticed in the cytological examination of uterine fluid in the study. Based on cytological and histological changes of uterus it is concluded that early postpartum injection of methyl ergometrine maleate caused the rapid uterine involution which led to enhanced conception rate in treatment group than control group.

Abbreviations used in text: TAI- Timed Artificial Insemination, AI- Artificial Insemination, CIDR- Controlled Internal Drug Release, rpm- rotations per minute, PGF2α- Prostaglandin F2α.

REFERENCES


Table 1: Cytology of uterine fluid in cows treated with methylergometrine maleate. Means bearing different superscript between column (a,b,c) within each row differed significantly (p<0.05). PMN - polymorphonuclear leucocytes, L – Lymphocytes, M – Monocytes

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Day 2 postpartum</th>
<th>Day 10 postpartum</th>
<th>Day 20 postpartum</th>
<th>Day 30 postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group I</td>
<td>PMN 83.89±0.65</td>
<td>77.89±0.72</td>
<td>70.56±0.93</td>
<td>75.56±0.84</td>
</tr>
<tr>
<td></td>
<td>L 15.11±0.85</td>
<td>17.22±0.36</td>
<td>26.44±2.21</td>
<td>23.22±1.18</td>
</tr>
<tr>
<td></td>
<td>M 1.00±0.26</td>
<td>4.89±0.22</td>
<td>3.00±0.29</td>
<td>1.22±0.31</td>
</tr>
<tr>
<td>2. Group II</td>
<td>PMN 86.44±0.38</td>
<td>84.56±0.56</td>
<td>91.67±0.50</td>
<td>88.22±0.74</td>
</tr>
<tr>
<td></td>
<td>L 11.89±0.48</td>
<td>14.33±0.47</td>
<td>6.56±0.50</td>
<td>10.22±0.43</td>
</tr>
<tr>
<td></td>
<td>M 1.67±0.17</td>
<td>1.11±0.26</td>
<td>1.77±0.18</td>
<td>1.56±0.22</td>
</tr>
</tbody>
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