

Evaluation of Intra-Uterine Lugol's Iodine Therapy and Double PGF₂α Shot for Treatment of Subclinical Endometritis in Dairy Cattle

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ABSTRACT

This study was performed to diagnose subclinical endometritis in the field and to evaluate and compare the reproductive performance of repeat breeding dairy cows treated with intrauterine Lugol's iodine (1%) and double PGF₂α therapy. Two hundred eighty-six repeat breeding dairy cows brought to Veterinary Clinical Complex of the College, Tirunelveli during the period 2018-2022 were screened for subclinical endometritis with Whiteside test (positive) & polymorphonucleus (PMN) cells % (>5%), which revealed 20.98 % (60/286) incidence of subclinical endometritis (SCE). These 60 SCE positive animals were randomly divided into 3 equal groups. Group 1 (n=20) was subjected to sexual rest for one cycle, Group 2 (n=20) was treated with intrauterine Lugol's iodine (1%) therapy for three consecutive days and Group 3 (n=20) was treated with an injection Cloprostenol sodium 500 µg i/m twice on day 7 and day 18 post-estrus. The reduction in PMN % was highly significant (p<0.01) in group 3. The inter-estrus period did not vary between the three groups. The recovery rate from SCE in groups 1, 2, and 3 was 5%, 60%, and 80%, which was significantly (p<0.05) higher in group 3 followed by group 2 and group 1. The conception rates in groups 1, 2, and 3 were 0%, 40% and 70%, which was significantly (p<0.05) higher in group 3 and group 2. The study concluded that double PGF₂α shot therapy could efficiently manage infertility due to subclinical endometritis in repeat breeding dairy cattle and reduce the economic loss to Indian farmers.

Key words: Conception rate, Dairy cattle, Double PGF₂α shot, Lugol's iodine, PMN cells, Sexual rest, Subclinical endometritis

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INTRODUCTION

Successful management of dairy farms depends on harvesting a calf per year, which can be impeded due to reproductive disorders and causes huge loss to the farming community. Among the reproductive disorders, endometritis (subclinical and clinical) is most commonly observed under farm and field situations in crossbred cattle (Agarwal and Tomer, 2003). Subclinical endometritis is described as increased proportion of polymorphonuclear (PMN) cells in endometrial cytology associated with decreased pregnancy rate and increased inter-calving period (Kasimanickam *et al.*, 2005; Gilbert *et al.*, 2005). Diluted Lugol's iodine is the cheapest and the recommended method for uterine bacterial infection compared to hormonal treatment. Lugol's iodine has broad spectrum bactericidal effects. Treatment of subclinical endometritis (SCE) with parental or intrauterine infusion of antibiotic was used with varying degree of response (Singh *et al.*, 2000). On the other hand indiscriminate use of antibiotics in the affected animals culminates to loss of milk and development of microbial resistance (Hussaini, 2021; Thangamani, 2022). The above situations pose a great challenge to field veterinarians in the management of SCE. Hence, there is urgent need to find out an alternative therapy for treatment of subclinical uterine infections by activation

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of natural defense mechanism in the uterus. The present study was planned to compare the therapeutic efficiency of parenteral prostaglandin analogue (PGF₂α) with intrauterine Lugol's iodine therapy for management of SCE in cows under field conditions in India.

MATERIALS AND METHODS

Repeat breeding dairy cows (n=286) brought to Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli during the period 2018-2022 were screened for subclinical endometritis with Whiteside test in cervicovaginal mucus discharge (positive) and polymorphonuclear (PMN) cells (>5%) in the uterine fluid collected by uterine flushing technique (Thangamani, 2022). All the cows were subjected for systematic examination of cervix, uterine horns and ovaries by per-rectal palpation, Whiteside test, uterine fluid cytological investigations and ultrasonographic examination. Among the 286 repeat breeders examined, 60 cows were found positive for subclinical endometritis, whereas other cows found with ovarian abnormality, uterine adhesion, cervical fibrosis and other palpable abnormalities were excluded from the study. Sixty selected cows were randomly divided into 3 equal groups. Group 1 (n=20) cows were subjected to sexual rest for one cycle, Group 2 (n=20) cows were treated with intra-uterine Lugol's iodine (1%, 15 mL) therapy for three consecutive days and Group 3 (n=20) was treated with injection Cloprostenol sodium (PGF₂α) 500 µg i/m twice on day 7 and day 18 post-estrus. Therapeutic efficacy was evaluated based on reduction in PMN cells count, inter-estrus period, recovery rate and conception rate of respective treatment. The statistical analysis of the data was done as per the procedures described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Among 286 cows presented with the history of failure of conception, 60 cows were found positive for SCE with an incidence of 20.98%. The present finding corroborated with the observations of Gilbert *et al.* (2005) and Kumari *et al.* (2016), who also recorded incidence of SCE with 20.00 to 22.50%. Repeat breeding condition might vary from herd to herd as well as from one animal to another. The most common condition for repeat breeding syndrome in cow was SCE, which might be due to poor hygiene of animal environment, unhygienic and faulty insemination (Kumari *et al.*, 2016).

A highly significant decline (p≤0.01) was recorded in the mean PMN cell percentage of uterine discharge in double PG shots (Group 3) treated cows at subsequent estrus after treatment compared to pre-treatment value. Whereas, a significant (p≤0.05) decline in PMN cell percentage was observed in group 2 and group 1 cows at subsequent estrus (Table 1). The results of the present study implies that there was a significant reduction in the percentage of PMN cells following administration of double PGF₂α shots and intrauterine infusion of Lugol's iodine 1%. The present findings are in agreement with the observations of Ahmed and Elsheikh (2013), who reported that the effectiveness of PGF₂α could be due to its direct effect on the myometrium and the myometrial contractions helped to flush out the uterine contents like pus through opened cervix.

Table 1: The percentage of PMN cells (Mean ± SE) before and after treatment in uterine fluid of cows with subclinical endometritis

Groups (n=20 each)	Before treatment	At subsequent estrus	t-value
Group 1 (Sexual rest)	10.05±0.7*	7.43±0.9	7.942
Group 2 (Lugol's iodine, 1%, 15 mL, i/ut)	9.50±0.8*	4.85±0.6	6.689
Group 3 (Double PG shots, 500 µg, i/m)	9.04±0.6**	3.52±0.2	9.956

*Significant (p≤0.05), **Highly significant (p≤0.01) between periods within the group.

The inter-estrus period did not vary between the groups 1 and 2. However, group 3 was not compared for inter-estrus period with other groups, because of administration of prostaglandins on specified time on the estrous cycle.

The recovery rate from SCE in groups 1, 2 and 3 was 5%, 60% and 80%, which was significantly (p<0.05) high in group 3 followed by group 2 and group 1. The conception rates at subsequent estrus in groups 1, 2 and 3 were 0%, 40% and 70%, respectively. It was significantly (p<0.05) higher in group 3 and group 2 (Table 2) than control group 1, where none of the cows conceived. Both the recovery rate from SCE and conception rate were higher in double PGF₂α shot group than Lugol's iodine group. The present observations corroborated with the findings of Szenci (2016) and Singh *et al.* (2023), who recorded higher recovery and conception rates in PGF₂α treated endometritic cattle and buffalo, respectively. Higher recovery rate from SCE recorded in the PG shot group (Group 3) at subsequent estrus after treatment in the present study might be due to improved uterine health by inducing estrus in cows with a mature corpus luteum by PGF₂α, which resulted in physical expulsion of the bacteria and reduction in the PMN cell count. Further, PGF₂α induced luteolysis and thereby reduced the circulatory progesterone concentrations, which eliminated the immunosuppressive effect of progesterone. Moreover, PGF₂α and estradiol of induced cycle increased the concentrations of pro-inflammatory substances within the uterus, which is postulated to be the reason for the immuno-modulatory action of prostaglandins (Laven, 2003; Galvao, 2009; Szenci, 2016).

Table 2: Recovery rate from SCE and conception rate following treatment in cows affected with subclinical endometritis

Groups	Number treated	Number recovered	Number conceived
Group 1 (Sexual rest)	20	1 (5.00%)	0
Group 2 (Lugol's iodine)	20	12 (60.00%)	8 (40.00%)
Group 3 (Double PG shot)	20	16 (80.00%)	14 (70.00%)

The mode of action of Lugol's iodine on reproductive system was opined to be through hyperemia of the



uterine mucosa and enhanced uterine blood circulation it causes, which consequently leads to high degree of iodine absorption. The absorbed iodine stimulates production of thyroxine under the control of pituitary and hypothalamus glands, which increases body's metabolism including the reproductive tract. Lugol's iodine is an efficient protocol that improves the postpartum reproductive performance in the dairy cows (Dolezel *et al.*, 2008; Melia *et al.*, 2014). On the other hand, the use of iodine as a therapy for reproductive disorders has irritating effects and causes necrosis in the uterine mucosa (Nakao *et al.*, 1988).

CONCLUSION

From the present study it is concluded that the commercially available PGF₂α derivatives are proven to be useful in the treatment of uterine infection in cows. As compared to Lugol's iodine (1%), double PGF₂α shots 11 days apart could efficiently manage infertility due to subclinical endometritis in repeat breeding dairy cattle and reduce the economic loss to Indian farmers.

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