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Efficacy of Lugol's Iodine and Gentamicin in Repeat Breeding Cows Suffering from Uterine Infections

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ABSTRACT

The study was conducted to evaluate the efficacy of intrauterine Lugol's iodine and gentamicin (parenteral and post-AI) in repeat breeding cows (n=54). Repeat breeding cows were divided into two groups based upon the type of cervico-vaginal mucus (CVM) discharge, Group-1, n=28, repeat breeding cows having pus flakes or pus in uterine discharge; Group-2, n=26, repeat breeding cows having apparently clear CVM. For treatment purpose, 14 cows from Group-1 as Group 1(a) were infused 50 ml of 0.5% Lugol solution once on the day of estrus and 14 cows as Group 1(b) were injected gentamicin @ 5 mg per kg body weight intra muscular twice daily for three days, starting on the day of estrus. In Group 2(a), repeat breeding cows (n=15) were infused gentamicin @ 2 mg body weight 24 h post AI. Group 2(b) comprising of 11 cows served as untreated control. Overall conception rate in Group 1(a) was 72.7% as compared with 60% in Group 1(b) with 1.8 and 2.1 services per conception. Conception rate in repeat breeding cows having apparently normal CVM treated with post AI gentamicin intrauterine infusion didn't improve as compared to control (40% vs. 36%). It was concluded that the intra uterine infusion of lugol's solution once on the day of estrus in repeat breeding cows having purulent vaginal discharge was better in clearing the uterine infection than parenteral administration of gentamicin for three days.

Key words: Cows, Gentamicin, Lugol's iodine, Repeat breeder, Uterine infections.

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INTRODUCTION

Reproductive failure due to repeat breeding in cows remains economically the most important type of infertility in domestic animals. Bacterial endometritis among repeat breeding bovines occur more and most frequently than viral, protozoal or fungal endometritis (Saini *et al.,* 1995; Dohmen *et al.,* 1996). During the postpartum period, the uterus becomes contaminated with a wide range of bacteria. Uterine involution is usually resolved by

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3-5 weeks postpartum, although it is common that bacteria may still be present in the bovine uterus. The presence of opportunistic and pathogenic bacteria like Escherichia coli may lead to clinical or subclinical endometritis. Clinically, endometritis is characterized by the presence of purulent or muco-purulent cervicovaginal discharge after day 25 postpartum; however, whereas, subclinical endometritis is inflammation of the endometrium without purulent or mucopurulent vaginal discharge.

Parenteral and intrauterine infusions of different antimicrobial agents, immunomodulators and proteolytic enzymes (Singh *et al.,* 2020) had been used to treat clinical and subclinical endometritis with variable success rate. The treatment of endometritis with antimicrobials has met with varying degrees of success, inconsistent recovery rate, milk disposal, emergence of microbial resistance, and reduced phagocytic activity of polymorphonuclear leukocytes (PMN cells). The establishment of low cost readily available treatment with short interval from treatment to artificial insemination (AI) would be beneficial to farmers.

Therefore, the present study was undertaken to know the effect of (intrauterine and parenteral) and Lugol's iodine (intrauterine) administration in repeat breeding cows with bacterial endometritis to enhance fertility.

MATERIALS AND METHODS

Animals and Treatment Schedule: Repeat breeding crossbred cows (n=54) were used to evaluate the effect of three different interventions. Cows in estrus at the time of study were divided into two groups based upon the quality of cervico-vaginal mucus (CVM) discharge.

Group-1: Repeat breeder cows with apparent abnormal uterine discharge (n=28) having pus flakes or pus in uterine discharge. These were further subdivided into two sub-groups based upon the treatment regimen. Subgroup-1a; cows (n=14) were administered with 50 ml of Lugol's iodine (0.5%) intrauterine once on the day of estrus. Subgroup-1b; cows (n=14) were injected gentamicin @ 5 mg per Kg body weight intramuscular twice daily for three days, starting on the day of estrus. Insemination was done at next estrus in cows of both the subgroups with clear CVM.

Group-2: Repeat breeder cows with apparently clear CVM (n=26) were inseminated and were further subdivided into two sub-groups. Subgroup-2a; these cows (n=15) were infused gentamicin @ 2 mg per Kg body weight intrauterine 24 hours after insemination. Subgroup-2b; Repeat breeder cows n=11 of this group served as untreated control.

Insemination: After completion of treatment in group-1, the cows were kept under supervision for the detection of subsequent estrus. Cows detected in estrus hereafter were examined gynaecologically and those with normal CVM, uterine tone and follicle were inseminated by rectovaginal technique. Cows repeating within 45 days from the start of the treatment were re-inseminated.

All non-returning cows were examined per-rectally on day 60 post-insemination for pregnancy diagnosis.

RESULTS AND DISCUSSION

Repeat breeder cows with abnormal uterine discharge

Twelve out of 14 cows treated with lugol's infusion had clear uterine discharge on subsequent estrus (Table 1). Six cows got impregnated with first post treatment insemination. First service and overall conception rate (CR) in these animals were 45.4 and 72.7% respectively. Therapeutic effect of lugol's iodine may be attributed to its antiseptic and irritating property, leading to the removal of damaged endothelium and regeneration of healthy epithelial lining. Irritation to endometrium may have caused the influx of neutrophils to the uterine lumen thus enhancing uterine defense mechanism through stimulation of phagocytosis and hence clearance of infection. Average interval to conception after treatment was 31.6 ± 15.6 days. Pattnaik *et al.* (1992) observed that the intrauterine infusion of 0.3% lugol's iodine was highly effective in clearing the fungal infections of uterus. However, Huszenica *et al*. (1994) observed no difference in conception rate by treating with lugol's solution. Comparable results were reported by Cetin *et al.* (2019) whereas, lower pregnancy rate of 42.5% was achieved by Singh *et al.* (2018) and 40 % by Bhardwaz *et al.* (2018) following treatment (0.3% Lugol,s iodine) in the repeat breeding cows.

Yoshida *et al.* (2020) observed that 2% povidone iodine induces transient uterine inflammation, promotes regeneration of endometrial epithelial cells and improves fertility. Singh *et al.* (2020) observed reduction in endometrial inflammation and days nonpregnant after proteolytic enzyme treatment in water buffalo cows with sub clinical endometritis.

In the group 1b, ten out of 14 cows recovered at subsequent estrus after parenteral gentamicin treatment (Table 1). Out of these 10, three got pregnant on first post treatment AI. First service and overall CR were 30 and 60%, respectively. Average interval to conception after treatment was 34.6 ± 14.4 days. Carleton and Threlfall (1984) advised parenteral antibiotic therapy. Guedawy (1983) reported

that local treatments are inadequate in cattle having severe septic metritis, chronic metritis and pyometra, due to poor penetration and systemic absorption of gentamicin.

Table 1: Conception rate following treatment with Lugol's solution or gentamicin in repeat breeder cows with abnormal uterine discharge

Treatment	No. of animals	Recovered	Not responded	AI done	1st service CR	Overall CR	Services per conception	Avg. Interval to conception (days)
Lugol's iodine (Intra Uterine)	13	11	02	12	45.4	72.7	1.8	31.6
Gentamicin (i.m)	14	10	04	10	30	60	2.1	34.6

In the present study, the first service and the overall conception rate were higher in the cows treated with single dose of 50 ml intrauterine lugol's solution (0.5%) as compared to three days i.m. gentamicin treatment. Average interval to conception after treatment was also lower with lugol's solution. Further, single administration of Lugol's intrauterine has practical advantages. First, it saves time, labor and veterinary costs as compared to 3day treatment protocol with gentamycin. Second, there is no risk of development of antimicrobial resistance and withdrawal period associated with gentamycin.

Repeat breeder cows with apparently normal uterine discharge

Suspecting majority of the cases of repeat breeder as having low grade bacterial infection *i.e.* subclinical endometritis, this trial was to evaluate the therapeutic efficacy of a single post-AI intrauterine gentamicin treatment given in repeat breeder cows. Fifteen repeat breeding cows with apparently normal uterine discharge were inseminated at estrus. Post-insemination intrauterine gentamicin infusion was given after 24 h post-AI. Six of these returned to heat 21 days later. Out of nine non-returned cases, six (40%) were diagnosed as pregnant 60 days later. In the control group, 11 repeat breeder cows with apparently normal uterine discharge were inseminated without any treatment. Five of these returned to heat. Out of the six non-returned cows, four were diagnosed as pregnant (36%) and two as non-pregnant by rectal palpation after 60 days of insemination. Hence, no difference of CR in post-AI treated and untreated control cows was observed (Table 2).

Table 2: Conception rate following single post-AI intrauterine gentamicin infusion (2 mg/kg bwt) in repeat breeder cows with apparently normal uterine discharge.

Treatment groups	No. of Animals	Conceived	Conception rate (%)
Post-AI gentamicin	15	06	40
Control	11	04	36

Awasthi and Tiwari (1999) achieved more conception rate in cows given 750 mg of Cephalexin intrauterine 12-24 hours after insemination as compared to conception rate in controls. Stolla *et al.* (1991) observed no difference in conception rate with post-AI intrauterine Lugol's treatment. Awasthi and Nema (1995) also reported that indiscriminate intrauterine antibacterial treatment had decreased conception rate.

Generally, majority of farmers use visual observations to detect estrus in cattle and CVM discharge and mounting activity are the two prominent signs expressed during estrus (Singh *et al.,* 2021). Uterine health is one of the most important parameters for establishment of successful pregnancy. Therefore, cervico vaginal discharge must be examined properly during estrus. In addition to uterine health, the other factors affecting outcome of AI are estrus detection, quality of semen, management, expertise of AI technician (Singh *et al.,* 2008) and life span of ovulatory follicle (Singh *et al.,* 2009). Therefore, every repeat breeding cow should be thoroughly investigated to select the appropriate interventions.

CONCLUSIONS

A single intrauterine infusion of 50 mL Lugol's iodine solution (0.5%) resulted in better conception rate than a course of 3-day parenteral treatment of gentamicin in cows having apparent uterine infection associated with repeat breeding. Post AI intrauterine treatment with gentamicin (2 mg/kg body wt) in repeat breeding cows did not appear to have therapeutic significance in the repeat breeder cows with apparently normal uterine discharge.

CONFLICT OF INTEREST

Authors don't have any conflict of interest.

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