

Original Research Article

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Therapeutic Efficacy of Lugol's Iodine (I₂KI) in Infectious Repeat Breeder Crossbred Cows

Anavil Bhardwaz¹, S.P. Nema², S.S. Mahour, Sreshti Bagati¹ and Sudershan Kumar^{2*}

¹Department of Veterinary clinical complex, Khalsa Veterinary College, Amritsa, India

²College of Veterinary Science and A.H., N.D.V.S.U., Mhow (M.P.), India

*Corresponding author

ABSTRACT

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The present study was undertaken to evaluate the therapeutic efficacy of Lugol's Iodine in 20 infectious repeat breeder crossbred cows brought to the AI centre of Department of Veterinary Gynaecology and Obstetrics of College of Veterinary Science and Animal Husbandry, Mhow and in nearby Government AI centres. Animals were divided into two groups of ten in each. The animals in first group were treated with intrauterine infusion of 0.3 per cent concentration of I₂KI w/v dissolved in saline to make 30 ml at 24 hrs intervals for 2 days. The animals in control group were infused with 30 ml saline IU, at 24 hrs interval, for 7 days. The mean values of bacterial count in uterine flushing declined significantly ($P < 0.05$) after treatment in Lugol's Iodine group (from 323.88 ± 2.15 to $1.39 \pm 0.00 \times 10^4$ /ml) A non-significant increase in mean values of total Cellular count ($\times 10^6$ /ml) from 0.50 ± 0.01 to 0.608 ± 0.04 and non-significant decrease in mean values of PMNs % from 25.77 ± 0.20 to 20.05 ± 0.17 was in Lugol's Iodine group than in control group. An overall recovery rate of 60.00 per cent and conception rate of 40.00 per cent was found in Lugol's Iodine treated repeat breeder cross bred cows.

Introduction

Repeat breeding alone is a major cause of infertility and economic loss to dairy farming. A repeat breeding animal is the one, which has normal reproductive tract and normal estrous cycle but does not settle even to repeated services by a fertile bull or inseminated by quality semen (Sane *et al.*, 1982). The incidence of repeat breeding had been reported to vary from 7.31 to 23.88 per cent among bovines (Dutta and Dutta, 1989 and Singh,

1991). Improper management, nutritional imbalance, anatomical defects of genital tract, hormonal disturbances and endometritis has been recognized to cause repeat breeding. Of all these, bacterial endometritis is the major cause of repeat breeding (Saini, 1993).

Though, antibiotics are quite effective in treating endometritis, but *in vitro* sensitivity and relative *in vivo* efficacy, accurate dosage regimens (Sood, 2000) and compulsory milk disposal (Hussain and Daniel, 1992), make

Lugol's Iodine (I₂KI) most viable preposition in our country. Low I₂KI concentrations of 0.1 and 0.2 per cent are mostly being used with lower conception rates, however, Sood *et al.*, (2000) reported better efficacy in infectious repeat breeding cows in higher I₂KI (0.3per cent) concentrations.

The present study was undertaken to evaluate the therapeutic efficacy of intrauterine infusion of 0.3 per cent concentration of Lugol's Iodine (I₂KI w/v) in infectious repeat breeder crossbred cows

Materials and Methods

The study was conducted on clinical cases of endometritis in crossbred cows belonging to farmers brought to the AI centre of Department of Veterinary Gynaecology and Obstetrics of the College of Veterinary Science and A.H. Mhow (India) and nearby Government AI centres during period from December 2015 to April 2017. All the cows (> 90 days postpartum) were screened as per history, gynaecological examination, nature of estrual cervico-vaginal mucus and positive to white side test (WST) as per method of Popov (1969) to identify them as infectious repeat breeding crossbred cows. These crossbred cows were classified as repeat breeders based on cycling normally without any apparent genital abnormalities and repeated estrus after three or more consecutive services. The infectious repeat breeder cows thus identified were divided into two groups with ten animals in each, (T1 treatment group and T2 was kept as negative control).

Animals of T1 group were treated with intrauterine infusion of 0.3 per cent concentration of I₂KI w/v dissolved in saline to make 30 ml at 24 hrs intervals for 2 days whereas animals of control group were infused 30 ml saline for 7 days as placebo. The estrual cervico-vaginal mucus was examined for pH

before and after treatment at subsequent estrus using pH paper strips. All animals (T1 and T2) were flushed before start of the therapy and after 24 hours of administration of the lugol's Iodine and saline and 8-12 hours after they showed first signs of heat. Total bacterial count in uterine flushing was done as per Bauer *et al.* (1966). Total cellular count in the uterine flushing was determined by haemocytometric technique (Jain, 1986). Polymorphonuclear (PMNs %) cell count in the uterine flushing was made in smears prepared from the cell suspension received by centrifugation (3000 rpm for five minutes) on clean grease free glass slides, and stained with Giemsa stain (Kasimanickam *et al.*, 2004). Statistical analysis was carried out by using completely randomized design as per Snedecore and Cochran (1980).

Results and Discussion

The observations on the nature of the CVM revealed that during infection purulent discharge was observed in 30% cows and muco-purulent discharge in 60% cows, whereas the CVM of 10% cows was clear. Any alteration in the colour of estrual mucus will indicate genital infections (Bhat *et al.*, 2015). Following intrauterine infusion of lugol's Iodine, the discharge at subsequent estrus was observed as clear in 60% cows in comparison to untreated control group (10 %).

The present findings were in agreement with the earlier findings (Rahi, 2011; Kumar, 2013; Singh, 2016 and Bhardwaz, 2018) following treatment with Garlic extract in crossbred cows.

In the present study, the higher values of pH in repeat breeder cows are in close proximity to the values reported earlier (Modi *et al.*, 2011; Sudarshan Kumar *et al.*, 2015 and Bhardwaz *et al.*, 2018). In repeat breeding cows with endometritis due to infection, the metabolites

of bacteria and inflammatory exudates may alter the pH of estrual cervical mucus to alkaline side resulting in failure of conception due to death of spermatozoa (Ravikumar *et al.*, 2007; Bhardwaz *et al.*, 2018). Once the infection is eliminated, the pH of cervical mucus returns towards the normal neutral side. The clear estrual cervical mucus after treatment may be due to stimulation of uterine defense mechanism, increased phagocytosis and finally elimination of infection.

In the present study, the higher values of pH in repeat breeder cows are in close proximity to the values reported earlier (Modi *et al.*, 2011; Sudarshan Kumar *et al.*, 2015 and Bhardwaz *et al.*, 2018). White side test (WST) was performed on the estrual cervico-vaginal mucus of control and treated animals, before and after treatment. Most of the cows became negative to White side test following treatment with lugol's Iodine (60.00%) as compared to only 20.00 % cows in control group which reveals that the lugol's Iodine was most effective treatment for endometritis. The present findings corroborated with earlier study (Singh, 2016 and Bhardwaz *et al.*, 2018).

A significant decline ($p < 0.05$) in bacterial count ($\times 10^4/\text{ml}$) was observed from pre-treatment to post-treatment estrus in uterine flushing of lugol's Iodine group (323.88 ± 2.15 to 1.39 ± 0.00) as compared to control group (328.62 ± 0.17 to 296.96 ± 0.22). The per cent reduction was highest in Lugol's Iodine group than in control group. Keeping in pace with these results, Kumar (2010) reported significant drop in bacterial load in uterine flushing following treatment with lugol's Iodine. This reduced bacterial count might be due to increased influx of neutrophils in the uterine lumen and subsequent phagocytosis of viable bacteria (Klucinski *et al.*, 1990 and Hussain and Daniel, 1992). Further, significantly lower bacterial count was observed in treatment involving lugol's Iodine

indicating higher efficacy of treatment in eliminating bacteria. In control group, it remained elevated. Slight reduction in bacterial load in control group may be due to natural uterine defense mechanisms. Besides this, uterine flushings might have also reduced bacterial load. A non-significant increase and a non-significant decrease in the total cellular count ($10^4/\text{ml}$) and (PMNs) % values was observed from pre-treatment to post-treatment in uterine flushing of lugol's Iodine group (0.50 ± 0.01 to 0.608 ± 0.04) and (25.77 ± 0.20 to 20.05 ± 0.17), respectively. A non-significant change was found in TCC in control cows after normal saline infusion. The non-significant increase in cellular count in control group might be due to natural uterine defense mechanism. Lugol's iodine is used in different concentrations, ranging from 2 to 10 per cent, to treat uterine infections. It stimulates uterine contraction and tone, thereby increasing mucus secretion and mobilizing leukocytes (Roberts, 1971). Singh *et al.* (2010) in their comparative study on treatment of endometritis by different concentrations of lugol's iodine by intrauterine administration observed that 0.5 per cent Lugol's iodine was more effective as compared to 0.25 per cent and 0.1 per cent concentration in clearing CVM (83% vs. 33% and 0%, respectively) and increasing conception rates (66.6% vs 16.6% and 0%, respectively). Sood *et al.* (2012) reported that intrauterine infusion of 30 ml of 0.3 per cent I_2KI during estrus and one day later revealed a therapeutic success rate of 56.2 per cent in 16 cycling cows with moderate/moderate/severe clinical endometritis. Ramsingh and Mohan (2013) found that 0.1 per cent lugol's iodine was successful and inexpensive therapeutic option for the management of suspected fungal endometritis. Ahmed and Elsheikh (2014) reported that one per cent intrauterine infusion of lugol's iodine could be used successfully for treating sub-clinical endometritis and improving conception rates in cattle (Table 1 and 2).

Table.1 Therapeutic efficacy of Lugol’s iodine on Cvm, pH, White side Test, Bacterial count, Total cellular count and PMN (%) in infectious Repeat Breeder Crossbred Cows

| Parameters/Observations | | LUGOL’S IODINE (n = 10) | | Control (n = 10) | |
|---------------------------------------|---------------|------------------------------|-------------------------|-------------------------|-------------------------|
| | | Pre-treatment estrus | Post-treatment estrus | Pre-treatment estrus | Post-treatment estrus |
| CVM appearance | Purulent | 30.00 (3) | 20.00 (2) | 60.00 (6) | 50.00 (5) |
| | Muco-purulent | 60.00 (6) | 20.00 (2) | 40.00 (4) | 40.00 (4) |
| | Clear | 10.00 (1) | 60.00 (6) | 0.00 | 10.00 (1) |
| White side test | Positive | 100.00 (10) | 40.00 (4) | 100.00 (10) | 80.00 (8) |
| | Negative | 0.00 | 60.00 (6) | 0.00 | 20.00 (6) |
| CVM –pH (Mean ± SE) | | 8.24 ±0.02 ^A | 7.77 ±0.02 ^B | 8.36±0.02 ^X | 8.31±0.02 ^Y |
| Bacterial count (10 ⁴ /ml) | | 323.88± 2.15 ^A | 1.39± 0.00 ^B | 328.62±0.17 | 296.96±0.22 |
| Total cellular count (TCC) | | 0.50±0.01 ^A | 0.608±0.04 ^B | 0.433±0.02 ^X | 0.581±0.01 ^Y |
| PMNs (%) | | 25.77±0.20 ^A | 20.05±0.17 ^B | 27.84±0.12 | 25.57±0.27 |

Means bearing different superscripts within the row for a group differ significantly (p<0.05).

Table.2 Recovery rate and conception rate in different groups of infectious repeat breeding crossbred cows after treatment

| Groups | No. of cows | Recovery rate (%) | Conception rates (%) | | | |
|----------------|-------------|-------------------|----------------------|--------------------|--------------------|-----------|
| | | | 1 st AI | 2 nd AI | 3 rd AI | Overall |
| LUGOL’S IODINE | 10 | 60.00 (6) | 30.00 (3) | - | 10.00 (1) | 40.00 (4) |
| Control | 10 | 20.00 (2) | -- | 10.00 (1) | -- | 10.00 (1) |

Conception rate and recovery rate

After treatment with lugol's Iodine, 60 % recovery rate and 40 % conception rate was recorded in the present study as compared with control group (20 and 10 %). Recovery rate was found to be significant ($p < 0.05$). This could be due to the significant reduction of bacterial count in lugol's Iodine treated animal, as lugol's Iodine is well known for its increased influx of neutrophils in the uterine lumen and subsequent phagocytosis of viable bacteria (Klucinski *et al.*, 1990 and Hussain and Daniel, 1992). The present study is in agreement with Kumar (2010) who reported that after treatment with lugol's Iodine, 75 per cent recovery rate and 62.5 per cent conception rate was recorded as compared with control group 12.5 per cent and 25 per cent, respectively. Significantly better therapeutic effects of Lugol's iodine were evident by more number of cows with clear appearance of estrual cervico-vaginal mucus, no colour reaction to White side test, reduction in pH and bacterial count in uterine flushing and a significantly higher conception rate in comparison to control group cows. The low conception rate in untreated cows might be due to delay in the spontaneous elimination of infection by natural uterine defense mechanism.

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