RESEARCH ARTICLE

Effect of PGF2α and Methylergometrine during Puerperium in Gir Cows

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Abstract

The therapeutic efficacy of methylergometrine and PGF2α on uterine involution and postpartum fertility was studied in 18 (6/group) Gir cows. Animals of groups I and II were treated with single i/m injection of PGF2α and Methylergometrine immediately after parturition, respectively, while group-III served as untreated control. The time required for expulsion of fetal membranes was shorter in group-I (2.55 ± 0.60 hours) than in group II (3.03 ± 0.34 hours) and group III (4.10 ± 0.36 hours) but did not differ statistically. Time taken for completion of uterine involution was significantly (p <0.05) shorter in group I (28.67±1.12 days) than that of group II (35.83 ± 1.49 days) and group-III (41.00±1.46 days). The intervals for first estrus postpartum and service period were also significantly (p <0.01) shorter for group I (37.83 ± 1.10 and 89.50 ± 4.34 days) than in group-II (46.17 ± 1.40 and 108.33 ± 4.91 days) and group-III (50.83 ± 1.11 and 118.33 ± 4.40 days, respectively). The number of services per conception was non-significantly lower in group I (1.17 ± 0.17) as compared to group II (1.50 ± 0.34) and controlled group III (1.67±0.33). The conception rate was 100% in group I and 83.33 % each in group II and III. Thus, it can be concluded that use of PGF2α immediately after parturition in Gir cows enhanced the process of placental separation, hastened the uterine involution, decreased the service period, increased the conception rate and thereby reduce the calving interval to the profitable ambiance as compared to Methylergometrine and control groups.

Keywords: Methylergometrine, PGF2α, Expulsion of placenta, Uterine involution, Service period.

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Introduction

The puerperium or puerperal period is a critical phase in the reproductive cycle of dairy cows. Uterine involution, which includes reduction of uterine size, regeneration of the endometrium, elimination of bacterial contamination and resumption of ovarian cyclicity, occurs during this period and is a pre-requisite for subsequent gestation (Sheldon *et al*., 2008). The rate of submission of cows for service and the conception rate are the two major variables which influence the breeding efficiency of dairy herds. There is growing evidence that PGF2α has direct effect on the bovine ovary apart from those of luteolysis, particularly with regard to the postpartum resumption of ovarian activity (Thatcher and Wilcox, 1973). The Methylergometrine and oxytocin injection directly after parturition in dairy cows decreased the incidence of fetal membrane retention and improved the reproductive performance, in which Methylergometrine being more beneficial than oxytocin (Hussein and Metwelly, 2004). Because of the above facts, the present study was undertaken to reduce the calving interval in Gir cows by enhancing the postpartum uterine involution and inducting postpartum estrus using prostaglandins and Methylergometrine during puerperium.

Materials and methods

The present work was carried out on 18 Gir cows (6/group), from one week before their expected parturition to puerperal period and after that up to 120 days postpartum at Cattle Breeding Farm, JAU, Junagadh, Gujarat. The 1st group was treated with i/m Inj. of 25 mg PGF2α (Dinoprost tromethamine, Inj. Lutalyse, Pfizer Animal Health India Ltd), while 2nd group was treated with i/m Inj. of 5 mg Methylergometrine (Inj. Nexbolic, 5 mL vial, Intas Pharmaceuticals Ltd. Ahmedabad), immediately after parturition. The 3rd group did not receive any treatment and was kept as a control group. The animals were palpated at 72 hours intervals up to 45 days after parturition and uterine, as well as ovarian changes, were noted. The time required for expulsion of the placenta, placental studies, uterine involution (Patel *et al*., 2014), first estrus postpartum, service period and conception rate were recorded. Estrus occurrence was detected daily and females in estrus were

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bred through artificial insemination. They were palpated per-rectum for confirmation of pregnancy at 60 days post-breeding. The data generated were analyzed statistically using the Chi-square test and Tukey's test.

Results and Discussion

Placental Studies

The mean weight (kg) of the placenta from the groups I and II, control group III was 3.53 ± 0.06, 3.68 ± 0.07 and 3.47 ± 0.09, respectively (Table 1). The value was in close agreement with Patel *et al*. (2015) in HF crossbred cows, whereas Peter *et al*. (2014) in Mithun and Pugashetti *et al*. (2002) in HF X Doeni cows reported 2.51 ± 0.51 and 2.80 ± 1.2 kg weight of placenta, respectively, which were quite lower than the present finding. The number of cotyledons on placenta of non-gravid cornua differed significantly (p <0.05) with the lowest numbers in group II and highest in group III. However, the numbers in gravid cornua and the total of both gravid and non-gravid cornua were almost similar among three groups (Table 1 and Fig. 1).

Effect of Various Treatments on Puerperium

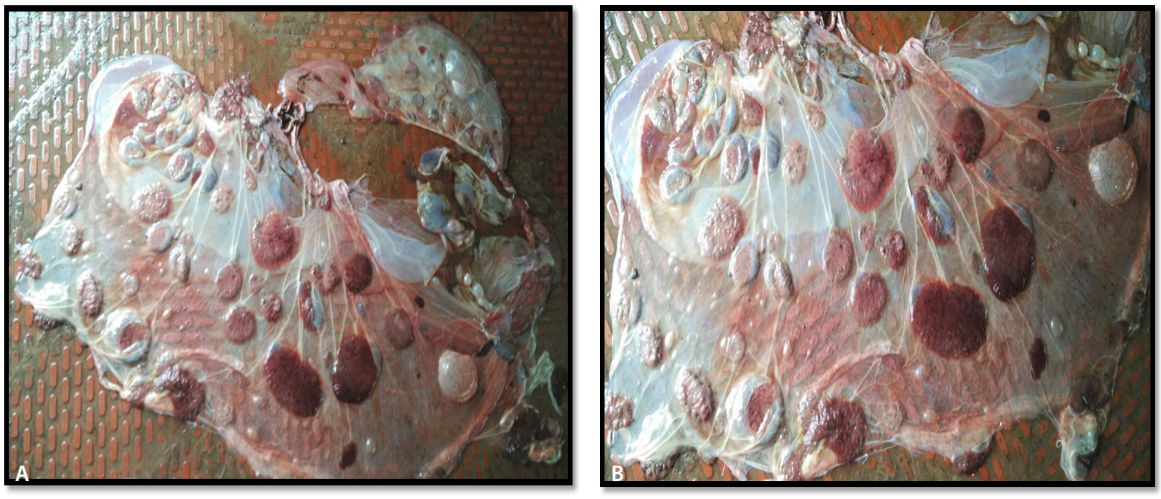
The expulsion of fetal membranes was significantly (p >0.05) earlier in group I (2.55 ± 0.60 hrs) than group III (4.10 ± 0.36 hours), while value of group II (3.03 ± 0.34 hrs) was statistically at par with either of the groups (Table 2). These findings were in agreement with Majeed *et al*. (2009) and Patel *et al*. (2015). On the contrary, El-Azad *et al*. (1988) reported that ergometrine was not effective for expelling fetal membranes, while Hussein and Metwelly (2004) reported the decreased incidence of retention of the placenta in cows after injecting Methylergometrine.

The mean time (days) required for completion of uterine involution for Group-I, II and III were observed to be 28.67 ± 1.12 days, 35.83 ± 1.49 days and 41.00 ± 1.46 days, respectively, which differed significantly (p <0.01) among each other. The time required for uterine involution was significantly shorter in PGF2α treated Group-I as compared to Methylergometrine treated Group-II and control group III. This observation clearly indicated that PGF2α accelerated the postpartum uterine involution in Gir cows. The results were at par with Patel *et al*. (2015) in HF crossbred cows and Khatri *et al*. (2013) in Kundhi buffaloes.

Table 1: Placental weights and number of cotyledons on the gravid and non-gravid portion of the fetal placenta in treated and control groups of Gir cows (Mean ± SEM)

	Groups				
Parameters	*Group-I*	*Group-II*	*Group-III*	*F value*	*p value*
Placental weight (kg)	3.53 ± 0.06a	3.68 ± 0.07a	3.47 ± 0.09a	22.09	0.15
No. of cotyledons on placenta of gravid cornua	64.34 ± 1.08a	65.5 ± 1.69a	63.33 ± 0.80a	0.75	0.48
No. of cotyledons on placenta of non-gravid cornua	27.67 ± 0.49ab	26.67 ± 0.71a	29.00 ± 0.58b	3.77*	0.047
Total no. of cotyledons on placenta of both cornua	92.00 ± 1.29a	92.17 ± 1.97a	92.33 ± 1.02a	0.01	0.98

Means bearing different superscripts within a row (between the groups) differ significantly (p <0.05).
Group-I = T1 (PGF2α), group-II = T2 (Methylergometrine), group-III = T3 (Control)



Figs 1A and B: Number of placental cotyledons in different groups

Table 2: Effects of different treatments on reproductive performance of the treated and control groups of Gir cows (mean ± SEM)

	Groups				
Parameters	*group-I*	*group-II*	*group-III*	*F value*	*p value*
Expulsion time of fetal membrane (hrs)	2.55 ± 0.60[a]	3.03 ± 0.34[ab]	4.10 ± 0.36[b]	3.154*	0.048
Involution of uterus (days)	28.67 ± 1.12[a]	35.83 ± 1.49[b]	41.00 ± 1.46[c]	20.53**	<0.001
First postpartum estrus (days)	37.83 ± 1.10[a]	46.17 ± 1.40[b]	50.83 ± 1.11[c]	29.46**	<0.001
Service period (days)	89.50 ± 4.34[a]	108.33 ± 4.91[b]	118.33 ± 4.4[b]	10.18**	0.002
Number of services per conception	1.17 ± 0.17	1.50 ± 0.34	1.67 ± 0.33	0.76	0.48)
Conception rate (%)	100.00	83.33	83.33	–	–
No. of pregnant animals	6/6	5/6	5/6	–	–

Means bearing different superscripts within a row (between the groups) differ significantly.
*Significant ($p < 0.05$), ** highly significant ($p < 0.01$).

In the present study, the mean first postpartum estrus interval was significantly lower (p<0.01) in Group-I (37.83 ± 1.10 days) and II (46.17 ±1.40 days) than in control Group-III (50.83 ±1.11 days) (Table 2). These results were in close agreement with 28.14 ± 1.68 and 43.50 ± 1.66 days recorded in PGF2α treated and control groups of HF crossbred cows by Patel *et al*. (2015). However, Sinha *et al*. (2002) reported longer first postpartum estrus, i.e., 80.28 ± 11.4 and 92 ± 12.4 days in cows treated with PGF2α within 24 hrs postpartum and control group.

The service period (days) of Gir cows for Group-I (89.50±4.34) was significantly (p <0.01) shorter followed by in Group-II (108.33 ± 4.91) and Group-III (118.33 ± 4.40) (Table 2). The results clearly showed the luteolytic effect of PGF2α on pregnancy CL of the ovary and earlier resumption of ovarian activities. Nosier *et al*. (2012) reported the first estrus postpartum and service period as 46.60 ± 0.54 and 76.11 ± 9.75 days in HF cows treated with Methylergometrine immediately after calving, whereas no significant difference was observed in service period after using PGF2α by Morton *et al*. (1992). The number of services per conception was nonsignificantly lower in PGF2α treated (1.17 ± 0.17) as compared to Methylergometrine treated (1.50 ± 0.34) and control (1.67 ± 0.33) group (Table 2). In our study, the conception rate was 100% in Group-I and 83.33% each in Group- II and III. The result in Group II was in agreement with Patel *et al*. (2014) in HF crossbred cows, whereas, lower conception rate of 79.12 ± 2.82% was reported by Habib *et al*. (2010) in Red Chittagong cattle and 70 % by Sinha *et al*. (2002) in crossbred cows treated with Dinoprost within 6 hrs postpartum.

Conclusion

Use of PGF2α and Methylergometrine immediately after parturition in Gir cows enhanced the process of placental separation, hastened the uterine involution, decreased the service period, increased the conception rate and thereby reduce calving interval to the profitable ambiance.

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