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RESEARCH ARTICLE

Effect of PGF_2~ treatment on conception rate and blood biochemical profile of post-partum suboestrous surti buffaloes

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Abstract : Postpartum suboestrous surti buffaloes of an organized farm confirmed by twice per-rectal palpation 11 days apart from 45 days post-partum were treated with 2 ml (500 µg) of inj. cloprostenol sodium I/M route in first group (n=6) and 2 ml (500 µg) of inj. cloprostenol sodium I/M route along with 5 ml inj. Vit. AD_3E preparation and 15 ml inj. Toldimphos sodium preparation I/M route in second group (n=6) on 55 days postpartum after confirmation of ovarian cyclicity. Six animals of same status were kept as control to see the oestrus induction response and conception rate including weekly evaluation of blood biochemical profile just before (0 day) treatment and 24 hr, 48 hr and 72 hr after treatment. The service period and oestrus induction interval in days was found significantly lower in $PGF_2\alpha$ treated (T_1 and T_3) groups as compared to T_2 and control (T_4) group clearly showed the luteolytic effect of $PGF_2\alpha$ on ovaries and earlier resumption of ovarian activities as compared to treatment (T_2) and control groups. The mean serum glucose, total protein, cholesterol, calcium and phosphorus levels of suboestrous surti buffaloes did not differ significantly within all the treatment and control groups and also between all the treatment and control groups at 0 hr, 24 hr, 48 hr and 72 hr interval including overall mean values in all the groups.

Key words : Biochemical profile, Conception rate, Suboestrus, Surti buffaloes, Hormone therapy

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INTRODUCTION

Silent oestrus is one of the major impediments in understanding reproductive parameters and assisted reproduction in buffaloes (Mondal *et al*., 2010). The period of post-partum sub-oestrus is usually longer in buffalo than in cattle under comparative managemental conditions (Azawi *et al.*, 2012). Sub-oestrus is a condition in which genital organs are undergoing normal cyclical changes but behavioural signs of oestrus are not manifested. Moreover, Blood-biochemical and mineral profile studies are important in diagnosis of healthy and diseased conditions of the animals.

The blood picture may vary in normal cycling and sub-oestrus animals. Hormonal therapies have been recommended to resolve these problems by most workers based on clinical response, but the reports on blood profile monitoring before and after such therapy are meagre (Jain and Pandita, 1995). Hence, the study was aimed to evaluate clinical response as well as serum profile of certain biochemical constituents prior to and after $PGF_2\alpha$ alone and $PGF_2\alpha$ along with vitamin AD_3E plus toldimphos sodium preparation treatment of post-partum sub-oestrus surti buffaloes.

RESEARCH METHODOLOGY

The study was conducted on twenty four suboestrous Surti buffaloes from 45 to 120 days post-partum. They were randomly divided into four groups (T_1, T_2, T_3 and T_4) comprising of six animals in each group. All these buffaloes had normal calving and subsequent normal genital health as assessed Gynaeco-clinically. Oestrus occurrence was detected daily in them with the help of teaser bull parading in morning and evening hours. The animals which were not exhibiting over signs of oestrus during routine heat detection programme were segregated and subjected to rectal palpation. The animals with palpable structures either corpus luteum (CL) or follicle, on either of the ovaries were selected for another palpation after eleven days apart to ascertain their cyclic nature and considered as silent heat/subestrous buffaloes. The buffaloes in T_1 group were treated with 2 ml of Inj. Cloprostenol sodium (Inj. Cyclix) (500 μg, $PGF_2\alpha$ analogue, I/M route); the buffaloes in T_2 group were treated with 2 ml of Inj. Cloprostenol sodium (Inj. Cyclix) (500 μg, $PGF_2\alpha$ analogue, I/M route) + [inj. Vit. AD_3E preparation (5 ml, I/M route) + inj. Toldimphos sodium preparation (15 ml, I/M route)] and the buffaloes in group C were kept as sub-oestrous control group. All these buffaloes were then followed for oestrus induction response, reproductive performance for upto 120 days post-partum. Approximately, 10 ml blood samples in serum clotting vaccutainers were collected from all those selected animals on 0 hr (prior to treatment), 24 hr, 48 and 72 hr post-treatment aseptically by jugular vein puncture. The vaccutainers containing blood samples were kept in slanting position at room temperature for 1-2 hours. Finally, serum was separated by centrifugation at 3000 rpm for 15 minutes and stored in properly labelled sterilized 4.5 ml plastic storage vials at –20°C in deep freezer until analysis. The biochemical and metabolic profile (glucose, total protein and total cholesterol) as well as macro-minerals (calcium, inorganic phosphorus) levels were determined in blood serum samples by using standard assay kits and an auto analyzer (Merck's Micro-lab 300 analyzer, Vital Scientific, DIEREN-Netherlands).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under Tables 1 to 3.

Oestrus induction response and conception rate :

The mean intervals (days) from calving to conception for treatment groups- T_1, T_2, T_3 and control (T_4) group were observed to be 66.83±4.07 days, 91.50±3.48 days, 67.33±3.85 days and 96.00±8.50 days, respectively. The overall service period of all the groups and thereby, treatment to oestrus induction interval was 80.42±4.98 and 11.19±1.31 days, respectively, with an overall conception rate 79.17 per cent (19/24).

The service period and treatment to oestrus induction interval of the suboestrus surti buffaloes in between T_1 (66.83±4.07; 03.50±0.34 days) and T_3 (67.33±3.85; 03.83±0.31days) treatment groups as well as in between T_2 (91.50±3.48; 16.75±2.56 days) and control C (96.00±8.50; 20.67±2.03 days) group did not differ significantly. However, the service period and treatment to oestrus induction interval of the suboestrus surti buffaloes in T_1 (66.83±4.07; 03.50±0.34 days) and T_3 (67.33±3.85; 03.83±0.31 days) treatment groups differed significantly from treatment T_2 (91.50±3.48; 16.75±2.56 days) and control C (96.00±8.50; 20.67±2.03 days) groups. It was observed that service period in the $PGF_2\alpha$ treated (T_1 and T_3) groups had been minimized upto 30 days earlier than that of treatment (T_2) and control (T_4) group.

The service period and oestrus induction interval in days was found significantly lower in $PGF_2\alpha$ treated (T_1 and

T_3) groups as compared to T_2 and control T_4 group under the study which clear cut showed the luteolytic effect of PGF$_2\alpha$ on ovaries and earlier resumption of ovarian activities as compared to treatment (T_2) and control groups. Moreover, there was no significant difference found in oestrus induction interval (days) between phosphorus and vitamins treated group (T_2) and control group; however, apparently lower oestrus induction interval in days (16.75±2.56) was found in treatment (T_2) group as compared to control group (20.67±2.03) which might be attributed to the influence of exogenous inorganic phosphorus and vitamins given to the animals in treatment (T_2) group. Earlier worker (Kumar *et al*., 2010) also has used vitamins and inorganic phosphorus as a therapy in the suboestrous cows and buffaloes with encouraging results.

Metabolic profile :

The average blood serum profiles of various metabolic constituents studied at 0 hr (prior to treatment), 24, 48 and 72 hr (post-treatment) in treated and control groups of suboestrous surti buffaloes.

The overall serum glucose, total protein and total cholesterol values in post-partum suboestrous surti buffaloes (in T_1, T_2, T_3 and C) groups were 64.30±0.71, 60.57±0.98, 59.73±0.90 and 63.22±0.83 mg/dl; 8.39±0.25, 7.85±0.20, 7.59±0.23 and 7.71±0.26 g/dl; 123.23±3.97, 115.49±3.21, 114.04±3.47 and 104.79±2.76 mg/dl, respectively, which did not differ significantly ($p>0.05$) among all the treatment and control groups. The overall mean serum values of the metabolic constituents (glucose, total protein and total cholesterol) were found to be within normal physiological

Table 1 : Effect of different treatments on reproductive performance of postpartum suboestrous surti buffaloes (Mean±SE)

Treatment/ group (n=6)	Service period (days)	Number of services per conception	Treatment to oestrus induction interval (days)	Conception rate (%)	No. of animals responded to the treatment	No. of pregnant animals (n=6)
T_1	66.83±4.07^a	1.33^a	03.50±0.34^a	100.00	6(100.00%)	6
T_2	91.50±3.48^b	1.50^a	16.75±2.56^b	66.67	4(66.67%)	4
T_3	67.33±3.85^a	1.33^a	03.83±0.31^a	100.00	6(100.00%)	6
T_4	96.00±8.50^b	1.33^a	20.67±2.03^b	50.00	3(50.00%)	3
Overall	80.42±4.98	1.37	11.19±1.31	79.17	19(79.17%)	19/24

Means bearing different superscripts within a column (group) differ significantly ($p\leq0.05$)
Group-I = T_1 (PGF$_{2\alpha}$); Group-II = T_2 (Vit+ P); Group-III = T_3 (PGF$_{2\alpha}$+Vit+ P) Group-IV = T_4 (Control)

Table 2 : Serum profile of glucose, total protein and total cholesterol at different time intervals/days in postpartum suboestrous (treated and control) Surti buffaloes (Mean±SE)

Time intervals/days	Glucose (mg/dl)				Total protein (g/dl)			
	(T_1)	(T_2)	(T_3)	Control	(T_1)	(T_2)	(T_3)	Control
0 hr/0th Day	64.05±0.71$_a^w$	60.07±0.98$_a^w$	61.89±0.90$_a^w$	63.40±0.83$_a^w$	8.37±0.25$_a^w$	7.92±0.20$_a^w$	7.62±0.23$_a^w$	7.58±0.26$_a^w$
24 hr/1st Day	63.75±0.71$_a^w$	62.94±0.98$_a^w$	57.85±0.90$_b^w$	62.51±0.83$_{ab}^w$	8.50±0.25$_a^w$	7.77±0.20$_a^w$	7.60±0.23$_a^w$	7.83±0.26$_a^w$
48 hr/2nd Day	64.78±0.71$_a^w$	60.02±0.98$_a^w$	59.88±0.90$_a^w$	63.73±0.83$_a^w$	8.31±0.25$_a^w$	7.86±0.20$_a^w$	7.56±0.23$_a^w$	7.70±0.26$_a^w$
72 hr/3rd Day	64.59±0.71$_a^w$	59.24±0.98$_b^w$	59.32±0.90$_b^w$	63.23±0.83$_{ab}^w$	8.35±0.25$_a^w$	7.84±0.20$_a^w$	7.58±0.23$_a^w$	7.71±0.26$_a^w$
Overall	64.30±0.71$_a$	60.57±0.98$_a$	59.73±0.90$_a$	63.22±0.83$_a$	8.39±0.25$_a$	7.85±0.20$_a$	7.59±0.23$_a$	7.71±0.26$_a$

Table 2 : Contd……

Time intervals/ days	Total cholesterol (mg/dl)			
	(T_1)	(T_2)	(T_3)	(T_4)
0 hr/0th Day	122.97±3.97$_a^w$	113.75±3.21$_a^w$	112.88±3.47 $_a^w$	105.33±2.76$_a^w$
24 hr/1st Day	123.77±3.97$_a^w$	115.30±3.21 $_a^w$	114.18±3.47 $_a^w$	106.61±2.76$_a^w$
48 hr/2nd Day	122.05±3.97$_a^w$	116.17±3.21$_a^w$	113.85±3.47 $_a^w$	103.19±2.76$_a^w$
72 hr/3rd Day	124.14±3.97$_a^w$	116.75±3.21$_a^w$	115.23±3.47 $_a^w$	104.01±2.76$_a^w$
Overall	123.23±3.97$_a$	115.49±3.21$_a$	114.04±3.47$_a$	104.79±2.76$_a$

Means bearing common superscripts within a column (group) do not differ significantly ($p<0.05$). Means bearing different subscripts within a row (between the groups) differ significantly ($p<0.05$).

ranges.

The mean serum glucose levels of suboestrous surti buffaloes did not differ significantly within all the treatment and control groups. However, the values in T_3 group (57.85±0.90 mg/dl) differed significantly at 24 hr with treatment groups T_1 (63.75±0.71mg/dl) and T_2 (62.94±0.98 mg/dl) but differed non-significantly with control group (62.51±0.83 mg/dl). Like that way, the values at 72 hr post-treatment, a significant difference was observed in serum glucose concentration between T_1 (64.59±0.71 mg/dl) with T_2 (59.24±0.98 mg/dl) and T_3 (59.32±0.90 mg/dl) groups. However, the mean serum glucose values did not differ between T_1 treatment and T_4 control group as well as between T_2 and T_3 treatment groups. Moreover, the mean serum glucose levels at 0 hr, 24 hr, 48 hr and 72 hr of T_4 control group did not differ significantly with any of T_1, T_2 and T_3 treatment groups at any time intervals. Though, the mean serum glucose levels in the study were found within the range with the normal glucose values (45-70 mg/dl) in this species. These findings are corroborated well with the reports of Khasatiya *et al*. (2006), who reported the overall pooled mean of blood plasma glucose in $PGF_2\alpha$ treatment group did not vary significantly from control group (57.93±1.63 vs. 61.45±1.52 mg %) in surti buffaloes; Arieli *et al*. (2008) reported plasma glucose concentration as 57.7±0.5 mg/dl at 50 days post-partum in cattle; whereas, little bit higher values as compared to present findings as 69.16±0.93 mg per cent; 65.59±1.23 mg/dl and 65.57±1.62 mg/dl vs. 66.31±3.22 mg/dl reported by Hadiya (2006) in triple crossbred cows; Ahmed *et al*. (2010) in Egyptian buffalo-heifers and Khan *et al*. (2011) in Murrah buffaloes during winter and summer seasons with non-significant difference, respectively.

The mean serum total protein levels of suboestrous surti buffaloes did not differ significantly at 0 hr, 24 hr, 48 hr and 72 hr within and between all the treatment and control groups at any time interval including overall mean values in all the groups. The mean serum total protein concentrations remained more or less similar to the observations recorded by previous workers in surti buffaloes (Shah *et al.*, 2003 and Khasatiya *et al.*, 2006); further, they reported the overall plasma protein levels were apparently higher in conceived buffaloes as compared to non-conceived groups but did not varied significantly. Moreover, present findings are in close agreement with those of Sharma *et al*. (1998), who reported total plasma protein content in suboestrus buffalo-heifers as 7.28±0.20 g/dl; whereas, little bit higher values as compared to our findings reported by Butani (2008) as 9.62±0.59 g/dl in suboestrous buffaloes-cows and by Prajapati (2011) as 9.83±0.84 g/dl in surti buffaloes.

The mean serum cholesterol levels of suboestrous surti buffaloes did not differ significantly within all the treatment and control groups and also between all the treatment and control groups at 0 hr, 24 hr, 48 hr and 72 hr interval including overall mean values in all the groups. In the present study, the mean serum total cholesterol concentrations remained more or less similar to the observations recorded by other workers. These findings are in close agreement with Khasatiya *et al*. (2006), who reported overall pooled mean serum cholesterol levels in $PGF_2\alpha$ treatment and control groups as 113.42±1.84 and 104.94±2.55 mg per cent, respectively, in suboestrous surti buffaloes. Further, they reported overall pooled mean concentration of total cholesterol concentration was significantly higher in $PGF_2\alpha$ (suboestrus) group as compared to GnRH (anoestrus) group (110.20±1.50 vs. 102.59±1.49 mg %). Whereas, higher mean plasma cholesterol concentration values in suboestrous crossbred cows (181.22±9.20 mg/dl) and slightly higher values in buffaloes (147.29±1.19 mg/dl) as compared to our findings were reported by (Patel, 2008). Moreover, higher overall mean plasma cholesterol levels in surti buffaloes during early breeding season (188.44±12.66 mg/dl),

Table 3 : Serum profile of calcium and phosphorus at different time intervals/days in postpartum suboestrous (treated and control) surti buffaloes (Mean±SE)

Time intervals/ days	Calcium (mg/dl)				Phosphorus (mg/dl)			
	(T_1)	(T_2)	(T_3)	Control	(T_1)	(T_2)	(T_3)	Control
0 hr/0th Day	$10.56\pm0.29_a^w$	$9.05\pm0.22_a^w$	$9.57\pm0.29_a^w$	$9.24\pm0.22_a^w$	$6.74\pm0.22_a^w$	$6.21\pm0.17_a^w$	$5.92\pm0.27_a^w$	$5.87\pm0.22_a^w$
24 hr/1st Day	$10.54\pm0.29_a^w$	$9.06\pm0.22_a^w$	$9.52\pm0.29_a^w$	$9.22\pm0.22_a^w$	$6.72\pm0.22_a^w$	$6.23\pm0.17_a^w$	$5.94\pm0.27_a^w$	$5.88\pm0.22_a^w$
48 hr/2nd Day	$10.57\pm0.29_a^w$	$9.08\pm0.22_a^w$	$9.53\pm0.29_a^w$	$9.21\pm0.22_a^w$	$6.72\pm0.22_a^w$	$6.30\pm0.17_a^w$	$5.90\pm0.27_a^w$	$5.90\pm0.22_a^w$
72 hr/3rd Day	$10.59\pm0.29_a^w$	$9.13\pm0.22_a^w$	$9.57\pm0.29_a^w$	$9.23\pm0.22_a^w$	$6.72\pm0.22_a^w$	$6.32\pm0.17_a^w$	$5.89\pm0.27_a^w$	$5.85\pm0.22_a^w$
Overall	$10.57\pm0.29_a$	$9.08\pm0.22_a$	$9.56\pm0.29_a$	$9.23\pm0.22_a$	$6.73\pm0.22_a$	$6.27\pm0.17_a$	$5.92\pm0.27_a$	$5.88\pm0.22_a$

Means bearing common superscripts within a column (group) and means bearing common subscripts within a row (between the groups) do not differ significantly ($p > 0.05$).

breeding season (184.93±10.15 mg/dl) and late breeding season (179.32±12.92 mg/dl) were recorded by Prajapati (2011).

Macro-minerals :

The overall serum calcium and phosphorus values in T_1, T_2, T_3 and control groups were 10.57±0.29 mg/dl, 9.08±0.22 mg/dl, 9.56±0.29 mg/dl and 9.23±0.22 mg/dl; 6.73±0.22 mg/dl, 6.27±0.17 mg/dl, 5.92±0.27 mg/dl and 5.88±0.22 mg/dl, respectively. The mean serum calcium and phosphorus values of suboestrous surti buffaloes did not differ significantly at 0 hr, 24 hr, 48 hr and 72 hr within and between all the treatment and control groups at any time interval including overall mean values in all the groups.

In case of mean serum calcium concentration, the observations made in the present study are in agreement with the findings of Khasatiya *et al*. (2006), they reported that overall pooled calcium level in $PGF_2\alpha$ treatment and control groups as 10.00±0.12 and 10.41±0.17 mg per cent, respectively, in surti buffaloes. Deshpande (2007) reported the serum calcium concentration in four groups *viz.*, Group-I ($PGF_2\alpha$ I/M), II ($PGF_2\alpha$ I/U), III (suboestrus control) and IV (normally cyclic) before treatment and post-treatment were found to be non-significant between and within groups with mean values as 10.67±1.63 mg/dl vs. 11.50±2.07 mg/dl, 10.16±1.33 mg/dl vs. 12.00±2.19 mg/dl, 11.00±2.53 mg/dl vs. 10.50±2.07 mg/dl and 10.33±2.34 mg/dl vs. 11.50±1.97 mg/dl, respectively in crossbred cows. Patel (2008) reported mean values of plasma calcium as 9.98±0.04 mg/dl in post-partum suboestrus buffaloes treated with $PGF_2\alpha$. Little bit higher values in murrah buffaloes as compared to findings in surti buffaloes were recorded as 11.29 mg per cent by Shrivastava *et al.* (1981); however, lower mean serum calcium values in suboestrous crossbred cows were reported by Jain and Pandita (1995) as 7.19±0.94 mg/dl. Moreover, Prajapati (2011) observed slightly higher overall mean plasma calcium concentration in surti buffaloes during breeding season 12.09±0.81 mg/dl.

The trend and values of serum phosphorus closely corroborated with the observations of Shrivastava *et al*. (1981) in murrah buffaloes during oestrus as 6.47 mg per cent, Pande *et al*. (1978) in mehsani buffaloes as 6.31 mg/dl (ranging from 4.32 to 7.12 mg/dl) and Khasatiya *et al*. (2006) reported non-significant difference in the overall mean plasma inorganic phosphorus values between $PGF_2\alpha$ treated and control groups as 6.74±0.18 vs. 6.81±0.21 mg/dl in surti buffaloes; whereas, Patel (2008) reported significant difference between mean plasma inorganic phosphorus values between $PGF_2\alpha$ treated and control groups as 6.40±0.06 mg/dl vs. 5.45±0.04 mg/dl in surti buffaloes. Prajapati (2011) reported mean plasma phosphorus values in surti buffaloes during breeding season within the range of our findings (5.92±0.07 mg/dl).

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