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Short Communication

Blood biochemical parameters during early post-partum period of Surti buffalo in relation to placental expulsion time

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ABSTRACT

Thirty healthy and normal Surti buffaloes of research farm were selected and put into three groups after parturition based on their placental expulsion time; Group-I -less than 5 hr; Group-II - 8 to 10 hr and Group-III - more than 12 hr. Blood samples were collected from jugular vein, starting immediately after parturition till complete expulsion of placenta at an interval of one hour. Average concentration of Protein in three groups was 7.83, 9.05 and 9.66 gm/100ml, respectively. Whereas, average concentration for total and free cholesterol was 133.18, 150.90 and 154.15 and 7.19, 9.77 and 9.82 mg/100ml, respectively. Disturbed Ca: P ratio because of significantly lower level of phosphorus; may be one of the factor in delayed placental expulsion in buffaloes.

Key wards : Surti Buffalo, placental expulsion.

Physiologically normal and healthy buffaloes of Surti breed exhibit variation in placental expulsion time. The time for placental expulsion ranged from 2 hr to 14 hr after parturition. The average time recorded for placental expulsion in Surti breed of buffaloes is 5.5 hr (Sarvaiya *et al.*,1990). Role of certain blood biochemical constituents in domestic animals for the cases of retention of placenta has well been documented. (Shukla *et al.*, 1983; Dutta and Dugwekar, 1983; Tariq *et al.*, 1984 and Rajpal and Vadnere, 1985; Mandli, *et al.*, 2002 and Ray *et.al.*, 2004)). Hence an attempt was made to trace out probable association of these biochemical constituents with placental expulsion time.

Multiperous Surti buffaloes of R. B. R. Unit farm which were healthy and physiologically normal with regards to their length of gestation and act of parturition were included in this experiment. All these animals were maintained under standard and optimum condition of breeding and management throughout the experimental period, colostrums was drawn from all these animals within 30 minutes of parturition as weaning of calf at birth is the routine practices of the farm.

After parturition, these animals were grouped into three groups (each with 10 buffaloes) on the bases of the time taken for placenta expulsion. Group-I - buffaloes which took less than 5 hr; Group-II -buffaloes which took 8 to 10 hr for placental expulsion and Group-III - buffaloes which required more than 12 hr for expulsion of placenta.

Blood sampling was done from Jugular vein immediately after parturition and continued with hourly interval till complete expulsion of placenta . The last three samples were collected at the specific phases of placental expulsion. *viz.*, Phase-I: as soon as placenta was seen in vaginal opening; Phase-II : immediately after complete expulsion of placenta; and Phase-III : one hour after expulsion of placenta.

Serum was harvested from these blood samples and analyzed for different biochemical estimation by standard methods; total Protein by Lowery *et al.* (1951); Cholesterol by Schoenheimer and Sperry, (1934); Calcium by Clark and Collips (1925); Inorgan

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Phosphorus by Fiske and Subbarao (1935) and Copper by Vantura and King (1951). Statistical analysis of the data was carried out as per the methods of Snedecor and Cochran (1967).

Protein : Average concentration of total protein for animals of Group- I , II and III was 7.83, 9.05 and 9.66 gm/100ml, respectively which reflected higher levels in animals which took longer time for placental expulsion. This difference were statistically significant ($P< 0.05$). Higher levels of protein may be due to its biosynthesis which would have became one of the reason for delay of placental expulsion as results Rajpal and Vadnere (1985) clearly indicated that animals with retained placenta had significantly higher protein levels. Earlier work carried out on same line in Surti buffaloes to find out Progesterone association with placental expulsion time revealed higher progesterone in animals having longer placental expulsion time (Pathak *et al.*,1989).Same way Chero *et.al.* (1971) and Omelty and Mann, (1974) also revealed higher levels of progesterone and protein in circulations are responsible for delay in placental expulsion. Based on these conclusion probably higher level of protein may be one of the reason for longer placental expulsion time in buffaloes of present study.

Cholestrol : Average levels of total and free cholesterol for Group- I, II and III were 133.48 and 7.19;150.92 and 9.77 and 154.15 and 9.82 mg/100 ml, respectively. The differed significantly between the group ($P< 0.05$) for stages immediately after parturition and stages of placental expulsion. (Table 1, 2 and 3). This indicates that both total and free cholesterol levels were higher in animals of Group- II and III where placental expulsion time was higher than normal. Cholesterol is precursor for steroid hormone which is known fact, hence probably high cholesterol may be supporting for higher steroid production which known for delay in placental expulsion. (Chow *et al.*,1977)

Calcium and Phosphorus : Average concentration of calcium for Group-I,II and III was 12.60,11.67 and 11.53 mg/100 ml and that for phosphorus was 6.48 , 5.51 and 5.41 mg/100 ml, respectively. The difference for phosphorus between the groups was statistically significant ($P< 0.05$). Both the parameter showed somewhat decreasing levels after parturition specifically in animals of Group – II and III. (table 2 and 3). Ratio of calcium to phosphorus also plays an important role in placental expulsion as Martymov (1964) clearly stated that disturbed calcium phosphorus ratio is the cause of retention of placenta. Mandali *et al.* (2002) found lower level of Ca (5.52+ 0.12 mg%) in the buffaloes responsible for retained fetal membrane . Further Ray

Table 1: Blood serum concentration of biochemical parameters (Mean ± S.E.) -Group-I

Parameters	0 hr	1 hr	2 hr	3 hr	I	II	III	Overall Average
Protein (gm/100 ml)	9.4 ±0.15	8.82 ±0.19	8.16 ±0.16	7.47 ±0.16	7.2 ±0.11	6.95 ±0.07	6.84 ±0.06	7.83
Total Cholesterol (mg/100 ml)	154.92 ± 0.91	150.39 ± 0.92	143.03 ± 1.25	135.09 ± 1.32	128.8 ± 1.48	121.44 ± 2.59	100.68 ± 2.01	133.48
Free Cholesterol (mg/100 ml)	8.53 ±0.22	7.61 ±0.17	7.29 ±0.28	7.19 ±0.21	7.02 ±0.18	6.45 ±0.15	6.26 ±0.11	7.19
Calcium (mg/100 ml)	11.65 ± 0.17	12.27 ± 0.23	12.54 ± 0.19	13.25 ± 0.38	12.5 ± 0.34	12.72 ± 0.25	13.26 ± 0.20	12.6
Phosphorus (mg/100 ml)	6.13 ±0.10	6.09 ±0.09	6.25 ±0..16	7.12 ±0.10	6.04 ±0.06	6.84 ±0.10	6.91 ±0.18	6.48
Ratio of Ca: P	1.90:1	2.01	2	1.86	2.06	1.85	1.91	1.94
Copper (mcg/100 ml)	191.65 ± 0.62	202.57 ± 1.16	208.13 ± 1.17	214.47 ± 2.46	219.71 ± 1.89	203.26 ± 1.10	157.97 ± 2.14	199.68

0 hr: Immediately after parturition, I: Placenta seen in vaginal opening
II: Immediately after placental expulsion III: One hour after placental expulsion.

Table: 2. Blood serum concentration of different biochemical parameters (Mean±S.E.) -Group-II

Parameters	0 hr	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	I	II	III
Protein (gm /100 ml)	10.99 ±0.08	10.83 ±0.10	10.05 ±0.16	10.32 ±0.29	9.66 ±0.19	9.05 ±0.28	8.04 ±0.37	7.99 ±0.07	7.96 ±0.10	7.4 ±0.22	7.21 ±0.18
Total Cholesterol (mg /100 ml)	171.68 ±0.88	149.44 ±1.88	169.52 ±0.85	151.6 ±0.91	163.43 ±0.84	162.08 ±0.78	154.83 ±0.49	141.87 ±1.38	142.19 ±1.29	133.55 ±2.85	119.99 ±0.65
Free Cholesterol (mg/100 ml)	10.86 ±0.24	11.26 ±0.27	10.53 ±0.27	10.83 ±0.69	10.77 ±0.22	10.18 ±0.14	9.81 ±0.26	9.18 ±0.25	8.36 ±0.11	7.99 ±0.15	7.75 ±0.19
Calcium (mg/100 ml)	12.37 ±0.17	10.55 ±0.18	9.62 ±0.16	10.29 ±0.18	11.01 ±0.22	12.06 ±0.66	12.43 ±0.14	12.64 ±0.13	12.25 ±0.11	12.58 ±0.12	12.55 ±0.16
Phosphorus (mg/100 ml)	5.78 ±0.11	4.41 ±1.38	3.78 ±0.17	4.11 ±0.04	5.02 ±0.08	6.12 ±0.03	6.29 ±0.08	6.32 ±0.09	6.14 ±0.09	6.24 ±0.13	6.45 ±0.13
Ratio Ca :P	2.14	2.39	2.54	2.5	2.19	1.97	1.97	2	1.99	2.01	1.94
Copper (mcg 100 ml)	215.12 ±3.62	196.12 ±3.05	207.11 ±3.51	192.74 ±2.38	188.25 ±2.75	183.2 ±2.99	190.61 ±2.52	200.56 ±3.15	210.79 ±2.66	197.96 ±2.29	170.81 ±2.43

0 hr: Immediately after parturition. I: Placenta seen in vaginal opening
II: Immediately after placental expulsion III: One hour after placental expulsion.

et al. (2004) also stated that Ca : P ratio less than 1:4 results in retention of placenta. In present investigation, ratio of calcium to phosphorus was remained between 1.85 to 2.06 in animals of Group-I, while it was disturbed and remained very high in animals of Group-II and III (Table: 2 and 3), causing delay in placental expulsion in this group. Study of Flegmator and Shiper (1961) and Maritynov (1964) also stated that retained placenta was associated with disturbance of mineral metabolism as evidenced by low levels of calcium and phosphorus which is very well reflected in present investigation .

Copper : Overall average concentration of copper for three groups was 199.68,195.75 and 190.39 mcg/100ml, respectively for Group- I, II and IIII, indicating highest concentration in animals where placental expulsion took minimum time and lowest in animals which took maximum time.

Animals of Group –I showed steady increase in the level after parturition till the appearance of placenta in vagina which started somewhere 4 hr after parturition. In case of animals of Group-II and Group- III, the levels of copper remained fluctuating after parturition and showed increasing trend towards initiation of placental expulsion i.e. appearance of placenta in vagina which started somewhere 8 hr and 12 hr after parturition in Group- II and III, respectively (Table 2 and 3).

Thus, study revealed that certain biochemical parameters like protein, calcium, phosphorus and copper during early post-partum period play important role to influence placental expulsion time in Surti buffaloes.

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Table:3. Blood serum concentration of different biochemical parameters (Mean±S.E.) -Group-III

Parameters	0 hr	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr
Protein	11.47	11.05									

Table:3. Blood serum concentration of different biochemical parameters (Mean±S.E.) -Group-III

Parameters	0 hr	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr	11 hr	I	II	III
Protein (gm/100ml)	11.47 ±0.21	11.05 ±0.20	10.61 ±0.20	11.13 ±0.07	10.58 ±0.20	10.94 ±0.06	11.15 ±0.08	10.67 ±0.14	9.88 ±0.05	8.85 ±0.07	8.54 ±0.11	8.05 ±0.05	7.58 ±0.17	7.3 ±0.11	7.07 ±0.04
Total	160.57	173.06	165.32	170.58	164.28	163.28	161.72	157.37	150.04	162.69	150.06	147.89	138.3	127.85	119.25
Cholesterol (mg/100ml)	±1.24	±0.052	±1.17	±0.74	±1.07	±1.69	±0.80	±0.89	±0.98	±2.11	±2.10	±0.98	±0.43	±2.34	±1.24
Free Cholesterol (mg/100ml)	11.74 ±0.12	10.67 ±0.12	11.43 ±0.16	10.38 ±0.14	11.01 ±0.22	10.26 ±0.16	11.51 ±0.17	10.11 ±0.12	9.93 ±0.05	9.39 ±0.09	8.49 ±0.17	8.6 ±0.17	8.51 ±0.14	8.03 ±0.04	7.33 ±0.10
Calcium (mg/100ml)	11.23 ±0.17	10.21 ±0.09	9.14 ±0.08	11.34 ±0.12	10.16 ±0.06	12.04 ±0.11	11.01 ±0.15	11.37 ±0.16	11.96 ±0.12	12.18 ±0.07	12.58 ±0.07	12.84 ±0.04	12.67 ±0.08	12.48 ±0.10	11.78 ±0.07
Phosphorus (mg/100ml)	5.52 ±0.08	4.92 ±0.05	3.25 ±0.08	4.19 ±0.05	3.01 ±0.07	4.19 ±0.04	5.84 ±0.05	6.11 ±0.03	6.09 ±0.05	6.18 ±0.07	6.49 ±0.11	6.56 ±0.06	6.52 ±0.09	6.26 ±0.07	6.02 ±0.03
Ratio Ca: P	2.03	2.07	2.81	2.7	3.37	2.81	1.88	1.86	1.96	1.97	1.93	1.95	1.94	1.99	1.95
Copper (mcg/100ml)	215.54 ±2.21	189.23 ±2.12	210.23 ±2.12	196.46 ± 1.19	202.36 ±1.30	194.26 ±1.14	176.83 ±1.50	169.73 ±0.28	170.22 ±5.30	185.79 ±1.10	183.79 ±0.59	203.36 ±0.99	207.13 ±0.90	188.23 ±0.59	164.65 ±4.12

0hr: Immediately after parturition, I: Placenta seen in vaginal opening
II: Immediately after placental expulsion III: One hour after placental expulsion

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