



Serum metabolites and macro mineral profile of prepartum buffaloes affected with cervico-vaginal prolapse

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ABSTRACT

Blood samples were collected from 36 pregnant buffaloes in third trimester of pregnancy. Out of total, 24 were suffering with pre partum vaginal prolapse (affected group) while the remaining 12 were normal pregnant buffaloes (control group). Serum was separated from blood and serum calcium, phosphorus, magnesium and other metabolic panels like protein, glucose, triglyceride, cholesterol and urea were estimated to study their relationship during cervico-vaginal prolapse. Mean serum calcium (mg/dl) concentration in affected group was significantly lower as compared to control buffaloes. Serum phosphorus and magnesium levels did not differ significantly between 2 groups. Serum glucose level (mg/dl) was significantly higher in affected group as compared to the control animals. Total protein (mg/dl) was significantly lower in prolapsed buffaloes as compared to healthy buffaloes. No significant difference of serum urea and cholesterol was found between affected and control groups while serum triglycerides (mg/dl) was significantly higher in prolapsed buffaloes (45.25) as compared to control group.

Key words: Buffaloes, Cervico-vaginal prolapse, Metabolic panel, Serum macro-minerals

Poor reproductive efficiency is the primary factor affecting productivity of a buffalo and is greatly influenced by late attainment of puberty, delayed age at first calving, seasonal breeding, long calving intervals, increased number of services per conception, late postpartum conception, summer anoestrus, increased days open, uterine infections and various obstetrical problems (Samad *et al.* 1987). Among prepartum reproductive disorders, vaginal prolapse is considered to be the major problem causing heavy economic losses to the farmers (Rabbani *et al.* 2010). Various predisposing factors of prolapse are increased intra-abdominal pressure associated with increased size of the pregnant uterus, intra-abdominal fat, or rumen distension superimposed upon relaxation and softening of the pelvic girdle and associated soft-tissue structures in the pelvic canal and perineum mediated by increased circulating concentrations of estrogens and relaxin during late

pregnancy. Higher estradiol concentration in later stages of pregnancy (Ali *et al.* 2012), deficiency of certain minerals and faulty management conditions often contribute to the prepartum vaginal prolapse (Seitaridis and Papadopoulos 1978, Nanda 1979). Minerals play a significant role in the regulation of physiological functions of the animal body in puerperal period. Mineral deficiencies and imbalances are often cited as causes of poor reproduction. There were significant differences in biochemical parameters parallel to changing physiology of the animals before and after parturition (Esposito *et al.* 2014). It was hypothesized that the deficiency or excess of some macro-minerals in the blood contribute to the occurrence of prepartum vaginal prolapse in buffaloes. The study of mineral and metabolite concentration in the serum during prolapse condition will help focusing on any nutritional role of prolapse occurrence. Keeping in mind these facts, the present study was conducted to investigate serum macro mineral contents in pregnant buffaloes suffering with prepartum vaginal prolapse in comparison with their pregnant healthy animals.

MATERIALS AND METHODS

Experiment was conducted during April to July 2012, on buffaloes coming for the treatment at the Teaching Veterinary clinical complex of College of Veterinary and Animal Husbandry, DUVASU, Mathura. Buffaloes (36) in

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third trimester of pregnancy were chosen for the experiment; 24 were suffering with prepartum vaginal prolapse (affected group) and the remaining 12 were normal pregnant buffaloes (control group). Blood (20 ml) from each buffalo was collected in a clean sterilized glass test tube through jugular venipuncture using a sterile 16 gauge needle. Test tubes containing blood were placed in slanting position for 2h to let the serum ooze out, while those tubes in which serum did not ooze out were centrifuged at 3,000 rpm for 10 minutes. The serum was aspirated carefully with a disposable glass pipette, placed in glass vials and stored at -20°C for further analysis.

The serum concentrations of calcium, phosphorus, magnesium, protein, glucose, triglyceride, cholesterol and urea were estimated by using chemistry analyzer using the commercial available kits. The mean and standard error of all the parameters studied of 2 experimental groups of buffaloes were calculated. The mean values were compared using independent sample t-test as per Snedecor and Chochran (1989).

RESULTS AND DISCUSSION

Metabolism of mineral substances plays a significant role in the regulation of physiological functions of the puerperal period. The ovarian activity of ruminants is influenced by mineral deficiency (Khan and Das 2011). Mineral deficiencies and imbalances are often cited as causes of poor reproduction. The mean serum calcium concentration (mg/dl) in affected group was significantly lower as compared to control group (Table 1). Mandali *et al.* (2002) and Ahmed *et al.* (2005) also reported lower calcium concentrations in buffaloes suffering from vaginal prolapse. The mean serum calcium concentration recorded in control group was higher than those reported by Jagatheesan *et al.* (2005), while it was lower than reported by Das *et al.* (2002) for buffaloes. These differences may be due to difference in geographical areas/soil mineral

content because the blood mineral contents in buffaloes and cows have been reported to differ from area to area (Akhtar *et al.* 2010). Reduced blood calcium may delay uterine involution and increase incidence of dystocia, retained placenta and prolapsed uterus (Morrow 1980). The mean phosphorus and magnesium concentrations (mg/dl) in affected group were statistically similar to control group. Khan *et al.* (1984) and Nanda and Sharma (1982) reported no difference in phosphorus levels between affected and control groups. However, Mandali *et al.* (2002) and Ahmed *et al.* (2005) reported significantly lower phosphorus concentration in buffaloes suffering with vaginal prolapse. Vicenti *et al.* (1992) reported no significant differences in magnesium concentration between prolapse affected and healthy buffaloes. However Ahmed *et al.* (2005) reported significantly lower serum magnesium concentration in buffaloes suffering with vaginal prolapse. Akhtar *et al.* (2008) reported higher serum magnesium concentration in buffaloes suffering with vaginal prolapse. Ahmad *et al.* (2005) conducted a study to determine serum macro mineral concentrations in buffaloes affected with genital prolapse and found significantly low serum calcium, phosphorus and Mg levels in prolapsed buffaloes. They concluded that low levels of Ca, P and Mg might be associated with the incidence of genital prolapse in these buffaloes.

Serum glucose level (mg/dl) was higher in affected group as compared to control animals (Table 1). The vaginal prolapse might have induced the stress on the affected buffaloes conferring an upsurge of the cortisol and thus secondary hyperglycaemia (Keller-Wood *et al.* 2014). Serum urea concentration (mg/dl) was slightly higher in affected group (38.24) than control group. High urea concentration in prolapsed animal could be related to either high protein metabolism due to catabolic effect of stress or due to reduced glomerular filtration and urea clearance during prolapse (Rodriguez *et al.* 1996). Total protein concentrations found in both groups were lower than even the normal reference values for buffaloes. Decrease in serum total protein may be ascribed to the fact that the foetus synthesizes all its proteins from the amino acids derived from the mother, and growth of the foetus increases exponentially reaching a maximum level, especially in muscles, during late pregnancy (Saba *et al.* 1987). Between two groups the total protein concentration was found lower in affected group and this might be due to the stress encountered during prolapse. Stress increases the cortisol level which has catabolic effect on protein metabolism (Gyton and Hall 2003). Significantly higher level of triglyceride in prolapsed buffalo may be due to mobilization of fat depot due to stress hormones (Table 1). Concurrently, total cholesterol was statistically similar in control and affected group of buffaloes reflecting no significant relationship between these two conditions.

From present study it can be concluded that nutrition may be the predisposing factor in occurrence of prolapse in buffaloes resulting into changes in the serum mineral and metabolite concentrations.

Table 1. Serum macro-mineral and metabolic panel levels in healthy and prolapsed buffaloes (mean $\pm$ SE)

Parameters	Healthy buffaloes (control)	Prolapsed buffaloes (affected)	P value
Calcium (mg/dl)	9.16 $\pm$ 0.38	7.03 $\pm$ 0.15 ^B	0.00
Phosphorus (mg/dl)	5.24 $\pm$ 0.25	4.65 $\pm$ 0.19	0.07
Magnesium (mg/dl)	3.04 $\pm$ 0.27	2.89 $\pm$ 0.19	0.65
Glucose (mg/dl)	31.0 $\pm$ 3.67	55.25 $\pm$ 6.68 ^A	0.02
Total protein (g/dl)	6.82 $\pm$ 0.20	5.82 $\pm$ 0.34 ^B	0.05
Urea (mg/dl)	31.96 $\pm$ 4.16	38.24 $\pm$ 3.12	0.24
Cholesterol (mg/dl)	72.25 $\pm$ 5.23	63.75 $\pm$ 4.67	0.27
Triglyceride (mg/dl)	18.12 $\pm$ 1.44	45.25 $\pm$ 7.74 ^A	0.00

^ASignificantly higher, when compared with the values of healthy controls. ^BSignificantly lower, when compared with the values of healthy controls.

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