

STUDY ON BIOCHEMICAL CHANGES DURING PERI-PARTURIENT PROLAPSE IN MURRAH BUFFALOES

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ABSTRACT

Genital prolapse is one of the major obstetrical problem, which can adversely affect the reproductive performance of buffaloes by various means as abnormal and delayed postpartum estrus, poor conception rate and increased calving interval as well as productive performance as milk yield. Present study reflects about the relationship between occurrence of genital prolapse and a lot of predisposing or related factors e.g. age, parity, gestational stage, prolapsed portion of genitalia, grade of prolapse, body score, udder condition and rectal temperature etc. The serum biochemical estimation in buffaloes suffering from genital prolapse revealed serum glucose concentration 54.81 ± 5.15 mg/dl which is higher than base values reported in buffaloes in advance gestation. Serum total protein and calcium concentration was found to be 6.23 ± 0.14 gm/dl and 7.34 ± 0.18 mg/dl respectively which is lower than the base values reported in buffaloes in advance gestation. On the basis of these alteration in blood biochemistry one can diagnose and/or manage the cases of genital prolapse in buffaloes more promptly.

Key words : Buffalo, Genital prolapse, Predisposing factors, Serum calcium Serum glucose, Serum total protein

The buffalo (*Bubalus bubalis*) is one of the highest milk yielder animal (Javaid *et al.*, 2009). Primary factor which affect the productivity of a buffalo is poor reproductive efficiency may be because of delayed puberty, age at first calving, prolonged calving intervals, higher number of services per conception, longer calving to conception interval, seasonal anoestrus, uterine infections and various types of obstetrical ailments. Cervicovaginal prolapse is the most common reproductive disorder of ruminants normally in late gestation leads to heavy economic losses to the farmers (Rabbani *et al.* 2010). It is characterized by the protrusion of varying parts of the vaginal wall and cervix through the vulva so that the vaginal mucosa is exposed (Arthur *et al.*, 2001) to external environment. Cervico vaginal prolapse can be found before or after parturition but uterine prolapse is observed only at postpartum stage. A lot of predisposing factors as sanity, parity, body condition, nutritional management, season and gestational stage etc are responsible for genital prolapse with involvement of mineral deficiency (Mainly Ca and P), hormonal imbalance and poor physiological body condition etc. The present study is targeted on the effect of various factors involved in the incidences of genital prolapse in Murrah buffaloes.

MATERIALS AND METHODS

Present study was conducted on Murrah buffaloes presented for the treatment of various types of genital prolapse at TVCC, COVSc. and AH, DUVASU, Mathura. Thirty one (31) Murrah buffaloes were taken to be studied for the prevalence of genital prolapse on the basis of history and clinical observations. Various parameters as age, parity, gestational stage, prolapsed portion of genitalia, grade of prolapse, body score, udder condition and rectal temperature were recorded at the time of the presentation of the case at clinical complex. Blood (15 ml)

from each buffalo was collected in a sterilized glass test tube from jugular vein using a sterile 18 gauge needle. Test tubes containing blood were placed in slanting position for 3h and then centrifuged at 2500 rpm for 10 minutes. The serum was aspirated carefully with disposable microtips and stored in glass vials at -20°C for further analysis. The serum concentrations of glucose, total protein, calcium and phosphorus were estimated by chemistry analyzer using the available commercial kits.

RESULT AND DISCUSSION

Relationship between age, parity, gestational stage, prolapsed portion of genitalia, grade of prolapse, body score, udder condition and rectal temperature with genital prolapse is summarized in Table 1. Serum concentrations of glucose, total protein, calcium and phosphorus in buffaloes with genital prolapse is summarized in Table 2.

The Condition of prolapse was found highest in age group of 4.1 to 6 years in comparison to other age groups. Generally genital prolapse in older and parous animals are more prominent because of the weak uterine ligaments and vaginal tissue (Dharani *et al.*, 2010). Poor endocrine regulation related to progesterone and estrogen ratio at late gestation is an important factor for occurrence of genital prolapse in heifer as well as older animals. Contradictory results in our study may be due to involvement of factor related to nutritional management as well as frequency of reporting of the particular type of cases cannot be neglected. Genital prolapse was found highest (58.06%) at 1st parity in compare to 2nd and 3rd parity. However Rabbani *et al.* (2010) found that the maximum prevalence of genital prolapse was in the 3rd lactation (29.69%), while the minimum prevalence was found in 1st lactation (6.06%). Tomar and Tripathi (1983) found higher incidences of prolapse in Murrah buffaloes and Woodward and Quesenberry (1956) in cow at their 1st parity. However,

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Taraphder (2002) reported that the parity order had no significant effect on the rate of incidence of prolapse in Murrah buffaloes. Significantly higher incidence of prolapse in later lactations has been reported by Akhtar *et al.* (2012) for Murrah buffaloes. According to Roberts (1971) the low prevalence of genital prolapse at 1st lactation may be due to the fact that old animals are with loose genitalia and young animals have tight genitalia compared to the older ones. But in our study, higher incidences of genital prolapse were found at 1st parity may be because of the poor calcium and phosphorus metabolism as well as irregular estrogen to progesterone ration near time of parturition. In present study prepartum prolapse was found maximum (22.58%) at the gestational stage of 8.1 to 10 months. It was lower at <8 months and >10 months of gestation. While cases of postpartum genital prolapse were found higher between 6 to 15 days after parturition which is higher than prolapse within 5 days between 15 to 25 days after parturition. Factors, such as the more intra abdominal pressure along with excessive relaxation of pelvic ligaments and perineal muscles due to higher levels of estrogen and relaxin at late gestation are considered (Mishra *et al.*, 1998) as responsible for genital prolapse.

Prolapse of cervix along with vaginal portion was found more than only vaginal prolapse. The uterine prolapse was also observed in only 9.68% cases. In majority cases, prolapse of vagina and cervix was evident. Prolapse of vagina usually involve prolapse of lateral walls and a portion of roof of vagina through vulva with cervix and uterus moves to caudal side. Hypocalcemia combined with irritation of birth canal, causing straining (Yadav *et al.*, 2014) which aggravate prolapsing condition. Prolapse of uterus is a common complication of third stage of labour (Joseph *et al.*, 2001). Forced extraction of the foetus, predisposes to tenesmus after relieving dystocia (Roberts, 1971) which may lead to prolapse of uterus. Open cervix and atonic uterus predisposes the uterine prolapse (Markandeya, 2014). According to symptoms and severity Markandeya (2014) classified the genital prolapse into four grades. In grade I prolapse there is protrusion of vaginal mucus membrane when animal is in sitting posture and retracted back on standing back. In prolapse of grade II, there is continuous exposure of vagina and cervix in any posture. In this condition there may be lacerations or injuries because of external agents as dog bite, crow bite etc. In grade III prolapse, there is complete eversion of vaginal mucosa, cervix and part of uterus with strainings. There may be regular forceful contractions, injuries and lacerations to prolapsed mass. Animal attempts to urinate but fails. In grade IV prolapse, there was prolapse of genital organs along with part of rectum with severe straining and discomfort. In our study prolapse of 1st grade and 2nd grade were found in maximum cases. Body score may also be a factor related to genital prolapse. It was seen that animals with moderate body size (approx 350 kg body weight)

Table 1
Percentage of affected animals

Sr. No.	Factors	No. of animals	%
1.	Age	2-4 Yr	41.94
		4.1-6 Yr	45.16
		6.1-8 Yr	12.90
2.	Parity	1 st	58.06
		2 nd	19.35
		≥3 rd	22.58
3.	Body size and approx. weight	Small (300 kg)	22.58
		Moderate (350 kg)	41.94
		Capacious (400 kg)	35.48
4.	Gestational stage	6-8 M	12.90
		8.1-10 M	22.58
		≥ 10 M	6.45
		Postpartum 5 days	19.35
		Postpartum 6 to 15 days	32.26
		Postpartum 16 to 25 days	6.45
5.	Prolapsed organ	Vaginal	16.13
		Cervico-vaginal	74.19
		Uterine	9.68
6.	Grade of prolapse	1 st	38.71
		2 nd	38.71
		3 rd	9.68
		4 th	12.90
7.	Rectal temperature	≤102 F	70.97
		≥ 102 F	29.03
8.	Udder status	Shrunk and wrinkled	19.35
		Moderate tumified teat & slight engorged udder	41.94
		Intense tumified teats & well engorged udder	38.71

were experienced genital prolapse maximum in compare to the small body size (approx ≤ 300 kg body weight) and capacious body size animals (approx ≥ 400 kg body weight). Low live weight at calving is found to be associated with high incidence of prolapse (Medina and Landicho, 2001). However, this finding is in contradiction with our results.

Regarding animal body physiology, rectal temperature was recorded ≤ 102^oF in 70.97% cases and > 102^oF in 29.03% cases of genital prolapse. The increased body temperature in buffaloes with genital prolapse may be due to varying degree of infection and inflammation of prolapsed organ because of exposure to air, dirt, soil and laceration/injuries. Sharma *et al.* (1977) reported genital prolapse due to urinary tract infection. Some animals did not show fever symptom may be because of the sub acute phase infection. Condition of udder and teats are also taken into consideration in this study. Cases without treatment for long period may be the cause of shrunk udder due to prolonged stress state. Also high milk

Table 2 :
Serum glucose, total proteins, calcium and phosphorus levels in prolapsed buffalo

Parameter	Prepartum Prolapse	Post partum prolapse	Total prolapsed buffalo
Glucose (mg/dl)	56.15 ± 8.13	53.83 ± 6.84	54.81 ± 5.15
Total protein (gm/dl)	6.25 ± 0.18	6.22 ± 0.21	6.23 ± 0.14
Calcium (mg/dl)	7.45 ± 0.15	7.27 ± 0.29	7.34 ± 0.18
Phosphorus (mg/dl)	6.49 ± 0.67	6.76 ± 0.51	6.65 ± 0.40

yielding capacity of animals may predispose the prolapsing condition

Serum glucose level was found higher in prepartum and postpartum prolapse cases than the base value (31.0 ± 3.67 mg/dl) as reported in Murrah buffaloes by Gangwar *et al.* (2015). Induced stress due to genital prolapse may lead to increased secretion of the cortisol and thus results in hyperglycaemia (Keller-Wood *et al.* 2014). Increased serum glucose in buffaloes with vaginal prolapse is also reported by Gangwar *et al.* (2015). However, Badalyan *et al.* (1989) and Sharma *et al.* (2014) reported significantly low blood glucose in buffaloes with cervicovaginal prolapse as compared to normal pregnant buffaloes. The decrease in blood glucose level at the end of gestation was due to a relatively poor nutrition, high-energy need for fetal metabolism and increasing fetal insulin (Tainturier, 1984). In present study, the value of serum total protein at the time of prolapse is found 6.23 ± 0.14 gm/dl (6.25 ± 0.18 gm/dl and 6.22 ± 0.21 gm/dl in prepartum and postpartum cases respectively) which is lower than the total protein value in healthy buffalo in advanced gestation (6.82 ± 0.20 g/dl) reported by Gangwar *et al.* (2015). Due to stress at genital prolapse, increased cortisol has catabolic effect on protein metabolism (Gyton and Hall 2003). Also because of the fact that the foetus synthesizes all its proteins for muscles growth from the amino acids circulating in mother specially during the faster growth at late gestation (Saba *et al.*, 1987). Decreased serum total protein in buffaloes suffering with vaginal prolapse also reported by Gangwar *et al.* (2015). The role of some macro-elements, like calcium and phosphorus, in buffaloes with pre-partum vaginal prolapse is well documented (Sah and Nakao, 2003; Akhtar *et al.*, 2008) as they maintain the tonicity of vaginal muscles and prevent the occurrence of vaginal prolapse (Akhtar *et al.*, 2012). Calcium, phosphorus and magnesium are necessary for nerve and muscle function i.e role in muscle contraction and nerve impulse transmission (Goff, 2006). Thus calcium and phosphorus level in serum may be an effective indicator for incidences of genital prolapse. Conventional supplement feeds with leguminous fodders (maize and sorghum) are generally low in calcium and phosphorus leads to increased risk of cervical prolapse (Habib *et al.*, 2007). Their deficiency causes reduced muscle tonicity of genitalia and excessive relaxation of weak pelvic ligaments, thus predispose the animal to genital prolapse. In present study serum calcium

level is found 7.34 ± 0.18 mg/dl in prolapse cases which is lower than the serum calcium level (9.16 ± 0.38 mg/dl) in healthy animal at advanced gestation (Gangwar *et al.*, 2015). Low serum calcium have been reported in buffaloes as the predisposing factor for cervico-vaginal prolapse (Pandey *et al.*, 2007; Gangwar *et al.*, 2015) and these finding support the present study. High level of serum estrogen in buffaloes with cervico-vaginal prolapse specially during last month of gestation may be responsible for lowered calcium level as negative correlation of estrogen and calcium concentration has also been reported (Seitaridis and Papadopoulos, 1978). Relaxation of the musculature by increased estradiol concentrations and reduced tonicity of the muscles due to hypocalcaemia and hypophosphatemia at late gestation act synergistically and lead to genital prolapse.

The overall prevalence of genital prolapse in buffaloes was recorded as 7.73% by Rabbani *et al.* (2010). Genital prolapse is a common obstetrical problem, which adversely affects the productive and reproductive performance of buffaloes by affecting postpartum estrus, conception rate and calving interval. There may be a lot of predisposing factors and etiologies responsible for genital prolapse in buffaloes. It is very difficult to trace out the exact cause of this reproductive disorder in a particular case but incidences can be minimized by avoiding the predisposing causes and improving the managerial condition according to the physiological state of the animal.

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