Peri-parturient metabolic profile in Murrah buffaloes with cervico-vaginal prolapse

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ABSTRACT

Profile of blood glucose, calcium, phosphorus and magnesium was studied during peri-parturient period i.e. on day 10 antepartum/day of prolapse, day of parturition and day 10 postpartum in 12 normal pregnant buffaloes and 12 buffaloes with antepartum cervico-vaginal prolapse during the last month of gestation. The blood glucose, serum calcium, phosphorus and magnesium concentration (mg/dl) in normal pregnant buffaloes were 62.13±1.01, 8.75±0.2, 6.04±0.12 and 1.7±0.10 on day 10 antepartum, 57.39±1.13, 8.30±0.25, 5.59±0.16 and 1.95±0.09 on day of parturition and 59.69±1.22, 6.69±0.23, 4.89±0.07 and 2.08±0.14 at day 10 postpartum respectively, whereas, the corresponding values in buffaloes with antepartum cervico-vaginal prolapse were 53.66±1.39, 3.99±0.11, 2.88±0.08 and 2.7±0.10 on the day of prolapse; 52.15±1.03, 6.77±0.29, 4.72±0.12 and 2.12±0.08 on the day of parturition; 57.63±1.28, 5.40±0.22, 4.29±0.14 and 1.89±0.14 on day 10 postpartum. The blood glucose, calcium and phosphorus concentration was significantly lower (p< 0.05) in buffaloes with antepartum cervico-vaginal prolapse as compared to normal pregnant buffaloes whereas, on day 10 antepartum/day of prolapse the serum magnesium concentration was significantly higher in buffaloes with antepartum prolapse as compared to normal pregnant buffaloes.

Key words: Buffalo, Cervico-vaginal prolapse, Metabolic profile, Peri-parturient.

INTRODUCTION

Hypocalcaemia and hypophosphatemia have been reported consistently in buffaloes as the predisposing factor for cervico-vaginal prolapse (Pandey et al., 2007). Most of the animals are stall fed and feed cost exceeds all operational costs (land, capital and labor). Conventional supplement feeds are generally low in calcium and phosphorus contents especially when fed with leguminous fodders such as maize and sorghum that lead to an increased risk of metabolic disorders and reproductive problems, i.e. prolapse of the cervix, retained fetal membranes and low conception rates (Habib et al., 2007). Adequate blood concentrations of macro minerals, calcium, phosphorus, magnesium and potassium are necessary for nerve and muscle function, therefore, are of particular concern at calving (Goff, 2006). Considering the significance of various macro minerals in etiology of cervico-vaginal prolapse, the experiment was conducted to study their concentration in normal peri-parturient buffaloes and buffaloes with cervico-vaginal prolapse.

MATERIALS AND METHODS

The experiment was conducted in organized dairy farms of Jabalpur (M.P.) during the period of January 2012 to April 2013 on 24 buffaloes. The animals were divided into two groups comprising of 12 normal pregnant buffaloes (Group-I/control) and 12 buffaloes with antepartum cervico-vaginal prolapse in last month of gestation (Group-II). Blood samples were collected on day 10 antepartum in normal pregnant buffaloes, on day of parturition and day 10 postpartum. Similar sample schedule was also followed in Group-II buffaloes except that the first sample was collected on the day of prolapse. Blood glucose (mg/dl) was estimated on the spot with Glucometer. Serum calcium, phosphorus and magnesium estimation was done by ERBA kit. The data were analyzed by two factor completely randomized design (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The mean blood glucose level (mg/dl) in buffaloes with antepartum cervico-vaginal prolapse (Group-II) on the day of prolapse, day of parturition and day 10 post-partum were 53.66±1.39, 52.15±1.03 and 57.63±1.28, and in normal pregnant buffaloes (Group-I) were 62.13±1.01, 57.39±1.13 and 59.64±1.22, respectively (Table 1).

The mean glucose concentration in control buffaloes (62.13±1.01) and buffaloes with antepartum cervico-vaginal prolapse (53.66±1.39) were significantly lower (p< 0.05) whereas the serum magnesium concentration was significantly higher in buffaloes with antepartum prolapse as compared to normal pregnant buffaloes whereas, on day 10 antepartum/day of prolapse the serum magnesium concentration was significantly higher in buffaloes with antepartum prolapse as compared to normal pregnant buffaloes.
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**TABLE 1: Blood metabolic profile in normal pregnant and buffaloes with antepartum cervico-vaginal prolapse**

<table>
<thead>
<tr>
<th>Biochemical constituents (mg/dl)</th>
<th>Groups</th>
<th>Day 10 antepartum/ day of prolapse</th>
<th>Day of parturition</th>
<th>Day 10 postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose</td>
<td>Group-I</td>
<td>62.13±1.01 (Day 10 antepartum)</td>
<td>57.39±1.13</td>
<td>59.64±1.22</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>53.66±1.39 (Day of prolapse)</td>
<td>52.15±1.03</td>
<td>57.63±1.28</td>
</tr>
<tr>
<td>Serum Calcium</td>
<td>Group-I</td>
<td>8.75±0.2 (Day 10 antepartum)</td>
<td>8.30±0.25</td>
<td>6.69±0.23</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>3.99±0.11 (Day of prolapse)</td>
<td>6.77±0.29</td>
<td>5.40±0.22</td>
</tr>
<tr>
<td>Serum Phosphorus</td>
<td>Group-I</td>
<td>6.04±0.12 (Day 10 antepartum)</td>
<td>5.59±0.16</td>
<td>4.89±0.07</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>2.88±0.08 (Day of prolapse)</td>
<td>4.72±0.12</td>
<td>4.29±0.14</td>
</tr>
<tr>
<td>Serum Magnesium</td>
<td>Group-I</td>
<td>1.72±0.10 (Day 10 antepartum)</td>
<td>1.95±0.09</td>
<td>2.08±0.14</td>
</tr>
<tr>
<td></td>
<td>Group-II</td>
<td>2.76±0.10 (Day of prolapse)</td>
<td>2.12±0.08</td>
<td>1.89±0.14</td>
</tr>
</tbody>
</table>

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The mean serum calcium level (mg/dl) in normal pregnant buffaloes and buffaloes with antepartum cervico-vaginal prolapse is presented in Table 1. Fairly comparable values of serum calcium as recorded in the present study in normal pregnant buffaloes at the time of parturition (8.30±0.25) and day 10 postpartum (6.69±0.23) were recorded by Sah and Nakao (2003) in Surti buffaloes. Mandali et al. (2002) also recorded comparable values of serum calcium in normal pregnant buffaloes (8.30±0.16) during advanced stage of gestation. The mean serum calcium level was significantly (P<0.05) lower in Group-II as compared to Group-I. Pandit et al. (1982), Mandal et al. (2002) and Ahmed et al. (2005) also reported lower calcium levels in buffaloes with antepartum cervico-vaginal prolapse than in control buffaloes during peri-parturient period. High level of estrogen in buffaloes with cervico-vaginal prolapse as reported in the past particularly during last month of gestation may be responsible for lowered calcium level as negative correlation of estrogen and calcium concentration has also been reported (Sciataridis and Papadapioulos, 1978). Calcium is required for neuromuscular excitability, muscle contraction and nerve impulse transmission and therefore, lowered calcium concentration (deficiency) may lead to reduced vaginal and uterine muscle tone ultimately leading to prolapse of genitalia (Roberts, 1986). The lower serum calcium level during last month of gestation recorded in buffaloes with cervico-vaginal prolapse attributed to this fact (Mandali et al., 2002 and Pandey et al., 2007).

The mean serum inorganic phosphorus level (mg/dl) in Group-II on day of prolapse, the day of parturition and day 10 post-partum was 2.88±0.08, 4.72±0.12 and 4.29±0.14, respectively and the corresponding values in Group-I was 6.04±0.12, 5.59±0.16 and 4.89±0.07, respectively (Table 1). The serum inorganic phosphorus level was found significantly lower in buffaloes with cervico-vaginal-prolapse (Group-II) as compared to normal pregnant buffaloes (Group-I). Significantly lower inorganic phosphorus in antepartum cervico-vaginal prolapse buffaloes as compared to their corresponding values in pregnant control has been reported by various workers (Pandit et al., 1982; Mandal et al., 2002; Ahmad et al., 2005) which is in agreement to present findings. Though the role of calcium in antepartum prolapse is not clearly understood but there is synergistic effect of phosphorus with calcium. The deficiency of both these minerals either causes lack of tone of muscles of genitalia and/ or weakness and excessive relaxation of pelvic ligaments, thus making the animal more prone to prolapse of genitalia (Nanda and Sharma, 1982). The significantly lower concentration of phosphorus at all the stages in Group II as compared to Group I can be explained in view of the above fact. The serum phosphorus concentration showed a declining trend from day 10 antepartum to the day of parturition and day 10 postpartum.
The serum phosphorus at day 10 antepartum may be associated with increased level of estrogen during period preceding parturition as it has been reported to raise phosphorus level (Hackett et al., 1957). A decline in phosphorus level at the time of parturition may be associated with its increased utilization because of enhanced carbohydrate metabolism (Hackett et al., 1957). The further significant (P<0.05) sharp decline of phosphorus concentration at day 10 post-partum may be associated with its increased flow to udder (Wilson et al., 1977). The significantly (P<0.05) lower phosphorus concentration in Group-II as compared to Group-I may also be due to its increased utilization due to stress and enhanced carbohydrate metabolism (Hackett et al., 1957).

The mean serum magnesium level (mg/dl) in Group-II on day of prolapse, the day of parturition and day 10 post-partum was 2.76±0.10, 2.12±0.08 and 1.89±0.14 mg/dl respectively, and in Group-I was 1.72±0.10, 1.95±0.09 and 2.08±0.14, respectively (Table 1). The serum magnesium level was significantly (p<0.05) higher in Group-II as compared to Group-I on day 10 antepartum. Similarly significantly higher magnesium level in antepartum cervico-vaginal prolapse buffaloes as compared to healthy pregnant buffaloes were also reported by Pandit et al. (1982) and Akhtar et al. (2008). The significantly (p<0.05) higher serum magnesium concentration in Group-II may be explained on the grounds that the decreased calcium concentration result in loss of tonicity of muscles of vagina and uterus, the magnesium increases in response to decreasing concentration of calcium (Radostits et al., 2010). Hence, subclinically, hypocalcaemia was considered to be over come by hypermagnesaemia in buffaloes with cervico-vaginal prolapse. The serum magnesium concentration showed a significant (p<0.05) declining trend from day of antepartum prolapsed to day of parturition and day 10 post-partum. Hence, returning to normal values which were not significantly different from control group. This indicates recovery from cervico-vaginal prolapse.

REFERENCES


