

Investigation of Clinical Hypocalcaemia in Cattle and Goats at the selected Veterinary Hospitals in Bangladesh and India



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Investigation of Clinical Hypocalcaemia in Cattle and Goats at the selected Veterinary Hospitals in Bangladesh and India



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List of abbreviations

Abbreviation	Elaboration
DLS	Department of livestock service
dl	Deciliter
G	Gram
IV	Intravenous
IM	Intramuscular
MVC	Madras veterinary college
Mg	Miligram
ml	Mililiter
Mmole	Milimole
SAQTVH	Shahedul Alam Quaderi teaching Veterinary hospital
Sc	Subcutaneous
UVH	Upazilla veterinary hospital

Abstract

Hypocalcaemia is a metabolic disease of cattle, goat, sheep, buffalo and bird etc hypocalcaemia occurs when the level of Calcium in blood goes to down 10 mg/dl or less. The study was conducted to estimate the proportionate prevalence of hypocalcaemia in cattle and goat and its animal level distribution at Upazila Veterinary Hospital, Chakaria; Shahedul Alam Quaderi Teaching Veterinary Hospital, Chittagong and Madras Veterinary College, India. The study also aimed to describe clinical signs of hypocalcaemia and treatment given for it. Data obtained were analyzed by STATA-11. Hypocalcemic cases were significantly higher in cattle than in goat within study site comparison (UVH: 14% versus 8.3%, $p \leq 0.05$, SAQTVH: 20% vs 17.4% $p \leq 0.05$ and MVC: 20% vs 10%, $p \leq 0.05$). Both cross breed cattle and Jamnapari had more hypocalcemic cases (8 and 7, respectively) than that of local indigenous cattle and goat (3 and 3, respectively). Female cattle and goat had higher cases (7 and 8, respectively) than male (4 and 2, respectively). The predominant clinical sign was unable to move for cattle and recumbency for goat. Seven of 11 hypocalcemic cattle were recovered, whereas 8 of 10 hypocalcemic goats were recovered after the treatment.

Keywords: Hypocalcaemia, Proportionate prevalence, Cattle, Goat.

Chapter 1: Introduction

Hypocalcaemia is a nutritional deficiency of Calcium (Ca) in blood. It occurs in different livestock species such as cattle, goat etc when the blood Ca level goes down to 10 mg/dl or less. It is characterized by anorexia, lethargic, unable to move, recumbency, subnormal rectal temperature and sluggish pupillary light reflection and relaxed of anal sphincter (Emanuelson and Oltenacu, 1998). The potential causes of hypocalcaemia are low dietary Ca and vitamin D supplement, improper ratio of Ca and Phosphorus (P) (2:1) and also imbalance of parathyroid hormone and calcitonin (Constable, 1999; Goff, 2008). Alkalosis due to excessive cations of Potassium, Sodium, Ca and Magnesium predisposes the animal to milk fever and subclinical hypocalcaemia (Tsioulpas *et al.*, 2007). Hypomagnesaemia in periparturient cow also increases the susceptibility of hypocalcaemia and milk fever (Van de Braak *et al.*, 1987).

The prevalence of hypocalcaemia was reported to be 15% in cattle, 9% in goat, 7% in sheep and 12% in buffalo in Bangladesh (Rahman and Haque, 2001) whereas 10% in cattle, 9% in goat, 8% in sheep and 14% in buffalo in India (Roche and Berry, 2006).

The identified potential risk factors associated with hypocalcaemia includes species, age, sex, breed and stage of production period. Cattle were reported to be more susceptible than any other livestock species (Constable, 1999). Cross breed, female, older animals and lactating animals were commonly affected by hypocalcaemia (Goff, 2008).

Hypocalcaemia greatly reduces the milk production, rumen and abomasal motility and increases the risk of abomasal displacement (Melendez, 2002). It also reduces feed intake so that greater body fat mobilization occurs in early lactation (Roche and Berry, 2006). Hypocalcaemia also directly impairs with immune cell responding to an activating stimulus (Kimura *et al.*, 2006).

The available treatment options were as follows (Pehrson and Fuji, 1998; Goff and Horst, 1993)

Treatment of hypocalcemia should be given as early as possible, especially if recumbency occurs. The fastest way to restore normal plasma Ca concentration is to administer an intravenous injection of Ca salts.

- The most effective IV Ca dose is about 2g Ca/100 kg body weight (BW) but it is safe to administer the Ca at a rate of 1 g/min. If administered too rapidly, fatal arrhythmia of the heart and cessation during systole can occur. Intravenous Ca treatment elevates blood Ca above normal for about 4 hours.
- Calcium salts can also be injected subcutaneously (SC). The amount of Ca that can be injected into a single SC site should be limited to 1–1.5 g Ca/100kg BW.
- Calcium preparations designed for intramuscular administration are Ca levulinate and Ca lactate. The dose is 0.5–1.0 g Ca/100kg BW and injected at 6–10 injections site.

The hypocalcaemia can be controlled by followings ways (Goff and Horst, 1993; Pehrson and Fuji, 1998; Melendez, 2002):

- Oral Ca treatment at calving to prevent hypocalcemia to the fresh cow. Best results are obtained with doses of Ca between 50 and 125 g Ca/dose. For the best control of hypocalcemia a dose is given at calving and again 24 hours after calving.
- The benefit of adding oral Ca on top of a properly formulated low dietary cation diet programmed does not seem to warrant the added expense.
- Maintain proper proportion of Ca in feed.

The present clinical study was conducted at a Government Veterinary Hospital and Teaching Veterinary Hospitals in Bangladesh and India. Among different cases of nutritional deficiency hypocalcemic cases were predominantly found and therefore clinical hypocalcaemia in cattle and goat were considered to investigate the details. The study was aimed to estimate the proportionate prevalence of hypocalcaemia in cattle and goat with its animal level distribution. The study also described clinical signs of the hypocalcaemia and treatment given against the cases.

Chapter 2: Materials and Methods

The present study was conducted at a Government Veterinary Hospital and Teaching Veterinary Hospital in Bangladesh and India. The Veterinary Hospitals included Upazila Veterinary Hospital, Chakaria, Chittagong, Bangladesh (13 January to 15 March 2015), Shahedul Alam Quaderi Teaching Veterinary Hospital, Chittagong Veterinary and Animal Sciences University, Bangladesh (23 to 28 April 2015) and Madras Veterinary College, Chennai, India (13 June to 9 July 2015, but this study based on 2 days worked at Large Animal Section). Both retrospective and prospective hypocalcemic cases were included in this study. Species, breed, age, sex, clinical signs (according to clinical and physical examination) and drug details for each individual case were recorded using the record keeping sheet.

In order to calculate the proportionate prevalence of hypocalcaemia in cattle and goats cases other than hypocalcemic cases were also recorded. The clinical hypocalcaemia was diagnosed based on clinical signs like unable to move, recumbency, subnormal rectal temperature and sluggish pupillary light reflection, and blood Ca level (below 10mg/dl or less) (for some cases) and also response to Ca therapy (for some cases).

Data obtained were entered into Microsoft excel 2007 and exported to STATA-11 (Stata corp, 4905, Lake Way Drive, College Station, Texas 778-45, USA) for statistical analysis. Descriptive statistics were performed. Fisher's exact test was applied to assess the difference of proportion of hypocalcemic and non hypocalcemic cases for different factors. The results were expressed as frequency and percentage against categories of each variable under the study. The level of significance was set at ≤ 0.05 .

Chapter 3: Results

3.1. Proportionate prevalence and distribution of clinical hypocalcaemia in cattle and goat

Hypocalcemic cases were significantly higher in cattle than in goat within study site comparison (UVH: 14% versus 8.3%, $p \leq 0.05$; SAQTVH: 20% vs 17.4%, $p \leq 0.05$ and MVC: 20% vs 10%, $p \leq 0.05$) (Table 1).

Table 1. Proportionate prevalence of clinical hypocalcaemia in cattle and goat at the selected Veterinary Hospitals in Bangladesh and India

Species	UVH				SAQTVH				MVC			
	Hypocalcaemia				Hypocalcaemia				Hypocalcaemia			
	N	+ (%)	-	<i>p</i>	N	+ (%)	-	<i>p</i>	N	+ (%)	-	<i>p</i>
Cattle	50	7 (14%)	43	0.73	5	1 (20%)	4	0.63	15	3 (20%)	12	0.49
Goat	60	5 (8.3%)	55		23	4 (17.4%)	19		10	1 (10%)	9	

UVH: Upazila Veterinary Hospital; SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital;

MVC: Madras Veterinary College

Cross breed, female and younger cattle were frequently affected by hypocalcaemia across study sites in this study (Table 2).

Table 2. Frequency distribution of proportionate prevalence of clinical hypocalcaemia in cattle at the selected Veterinary Hospitals in Bangladesh and India

Variable	Category	UVH	SAQTVH	MVC
		N	N	N
Breed	Local	2	0	1
	Cross breed	5	1	2
Sex	Male	3	1	0
	Female	4	0	3
Age (month)	< 6	4	1	0
	>6	3	0	3

N: Frequency number; UVH: Upazila Veterinary Hospital; SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital; MVC: Madras Veterinary College.

Jamnapari and female goats had more cases (7 and 8, respectively) in comparison with the local and male goats (3 and 2, respectively). Older goats were commonly affected by hypocalcaemia (Table 3).

Table 3. Frequency distribution of proportionate prevalence of clinical hypocalcaemia in goat at selected Veterinary Hospitals in Bangladesh and India

Variable	Category	UVH	SAQTVH	MVC
		N	N	N
Breed	Local	1	1	1
	Jamnapari	3	4	0
Sex	Male	0	2	0
	Female	5	2	1
Age(month)	< 6	1	3	0
	>6	3	2	1

N: Frequency number; UVH: Upazila Veterinary Hospital; SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital; MVC: Madras Veterinary College.

3.2. Distribution of clinical signs of hypocalcaemia in cattle and goat

Predominant clinical sign in cattle was unable to move (10) followed by recumbency (8) and sluggish pupillary light reflection (6). More frequently observable sign in goat was recumbency (7) followed by sluggish pupillary light reflection (6) and unable to move (5) (Table 4). Calcium level was determined only for 3 hypocalcemic case in MVC (5-7 mg/dl) and 1 case in SAQTVH (7.9 mg/dl) and 3 hypocalcemic goats in SAQTVH (6.3-7 mg/dl).

Table 4. Distribution of clinical signs recorded for hypocalcaemia in cattle (N=11) and goat (N=10)

Clinical Signs	Cattle	Goat
	N	N
Recumbency	8	7
Sluggish pupillary light reflection	6	6
Unable to move	10	5

N: Frequency number



Figure 1.1. Sternal recumbency of goat.



Figure 1.2. Lethargic goat.



Figure 1.3. Lateral recumbency Of calf



Figure 1.4. Drug administration in calf.



Figure 1.5.Calcium therapy in cattle



Figure 1.6. Lateral recumbency in cattle

Figure 1.Typical clinical signs of hypocalcaemia observed for cattle and goat

3.3. Treatment given against hypocalcaemia

The recovery rate after treatment was 7 of 11 for hypocalcemic cattle and 8 of 10 for hypocalcemic goats (Table 5).

Table 5. Treatment prescribed against hypocalcaemia in cattle and goat and their response

Species	Drug and route	Dose	Recovered no.	Died no.
Cattle	Cal D Mag and IV/SC	2g/100kg body weight	7	4
	5% DNS and IV/SC	Based on level of dehydration		
	Vitamin ADE and IM	15-20 ml		
Goat	Similar line of treatment as followed for cattle	Do	8	2

IV: intravenous; IM: intramuscular; SC: subcutaneous; BW: Body weight

Chapter 4: Discussion

When serum calcium level falls below 10mg/dl or less then the condition is called hypocalcaemia. It frequently occurs in cattle, goat, sheep, buffalo etc. Hypocalcaemia abruptly reduces milk production. Cattle were more commonly affected by hypocalcaemia than goats in this study which is supported by a previous study (Lean *et al.*, 2006). This could be because cattle is large animal and produce more milk and therefore needed for more Ca. Cross breed had more hypocalcemic case in this investigation which is similar to the finding of (Kimura *et al.*, 2006) and it may be due to

more milk production occurred in cross breed than local and thus more Ca losses through milk and hence hypocalcaemia occurs. Higher number of cases in the female and older cattle in the present study corresponds to the study performed by (Bushinsky *et al.*, 2003).

Jamnapari appeared more hypocalcaemia than local indigenous goats in this study. It may be due to larger body size than local. However, a study conducted by (Littledike and Golf, 1987) reported the greater hypocalcaemia cases in local indigenous goat. In present study, the unable to move was predominant clinical sign in hypocalcemic cattle which is well supported by earlier studies (Shank *et al.*, 1981; Curtis *et al.*, 1985; Stevenson and Lean, 1998). In goat recumbency was commonly encountered clinical signs in present study, which is supported by (Ramberg, 1995).

Hypocalcemic cases of cattle and goat treated with the combination of Ca borogluconate, Vitamin (ADE) and DNS were successful in recovery of cases in this study which suggests treatment given was satisfactory. This result conforms to other studies (Pehrson and Fuji, 1998; Goff and Horst, 1993).

Limitations

The present study includes small area, short time period and less number of cases. Diagnosis was broadly based on clinical signs. Inclusion of retrospective hypocalcaemia was also a limitation as information of retrospective cases was not as accurate as prospective cases.

Conclusion

Hypocalcemic cases were significantly higher in the cattle than in goats. Cross breed (cattle), Jamnapari, female and older animals were commonly affected by hypocalcaemia. Common clinical signs were unable to move and recumbency. Calcium preparation along with vitamin ADE and DNS was successful in recovery of most of the cases.

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Biography

I am Md Nurul Quader, from Cox's Bazar. I completed my Secondary School Certificate (SSC) examination in 2006 with GPA-5 from Bohadder kata High School, Cox's Bazar and Higher Secondary Certificate (HSC) examination in 2008 with GPA 4.10 from Chittagong University College, Chittagong. Currently I have been doing my internship programme which is the compulsory of DVM programme under the Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University. My favorite hobby is reading books. I feel much interest in exploring new techniques for contributing in development of veterinary field in Bangladesh.

