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Clinical Characteristics and Ruminal Fluid Evaluation in Buffaloes Affected with Gastrointestinal Tract Atony

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ABSTRACT

The study was conducted in 50 clinical cases of non-traumatic primary gastrointestinal tract atony in buffaloes. Higher incidence of disease was found in buffaloes of 4-6 years age and in 2nd to 3rd lactation. Complete loss of production was found in all animals affected with gastrointestinal tract atony. Loss of defecation or reduced amount of feaces with or without melena along with colic signs were the most important clinical findings. The ruminal fluid analysis revealed slight alkaline ruminal fluid pH with watery consistency, weak aromatic odour, delayed methylene blue reduction test and sedimentation floatation test in all affected buffaloes. Medium size protozoa with reduced activity or nil protozoal activities were observed. More gram positive bacteria as compared to gram negative bacteria were observed in ruminal fluid of diseased buffaloes. The findings of present study will be helpful in diagnosis and suggesting therapeutic treatment of the animals affected with gastrointestinal tract atony.

Key words: *Buffaloes, Gastrointestinal tract, Atony, Ruminal fluid.*

INTRODUCTION

Gastrointestinal tract motility represents the most common consequence of gastrointestinal tract diseases. Disruption in gastrointestinal tract motility can result in hypermotility or atony, distention of segments of the gastrointestinal tract, abdominal pain, dehydration and shock[1].

Ruminal motility is a very important function for digestion in ruminants. Typically one secondary cycle of contraction (ruminal contraction) follows two primary cycles (two biphasic reticular contractions), so that three contractions occurs every two minutes[2]. Ruminal contraction sequences rely almost completely on motor nerve activation arising from medulla oblongata. Gastric centers in medulla integrate sensory inputs and generate motor impulses, both of which carried in the vagus nerve. Generation of motor impulses relies greatly on excitatory than inhibitory input from the sensory nerves to determine the rate, magnitude and duration of primary cycle of contraction[3,4]. Normal reticulo-ruminal contraction is very much essential for proper digestion.

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Gastro-ileal reflux is an important finding in the animals affected with gastrointestinal motility disorder. Therefore, ruminal fluid examination is important to determine the cause of the disease of the forestomach[5].

Gastrointestinal tract atony is manifested through various symptoms *viz.* inappetance to anorexia, dehydration, constipation, scanty or absence of feces with or without mucus and blood, recurrent tympany, loss of production and body condition, abdominal distension, suspended rumination, reduced or absence of ruminal motility, colic signs, sometimes fever etc. which not only affect the livestock itself but also affect the economy of the farmers[1]. Therefore, the present study was undertaken to explore the clinical characteristics and ruminal fluid evaluation in buffaloes affected with gastrointestinal tract atony.

MATERIAL AND METHODS

The study was conducted in Department of Veterinary Medicine, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar.

SELECTION OF ANIMALS

Complete case history and clinical examination of the suspected animals was done which were presented with decreased ruminal motility. Animals having history and clinical symptoms of inappetance/anorexia, reduced or absence of feaces with or without blood and mucous and distended abdomen were suspected to be the cases of non-traumatic gastrointestinal tract atony were included in the study. Eight apparently healthy buffaloes were also included in this study as a control group to compare the findings of diseased animals with apparently healthy animals.

RUMINAL LIQUOR ANALYSIS

Rumen liquor samples were collected aseptically using a 15-gauge, 4.5-cm-long needle inserted perpendicularly into the left paralumbar fossa. After aspiration of ruminal fluid, its pH was measured by wide range (2-10.5) pH paper strips. Colour, consistency, odour, MBRT (methylene blue reduction time), sedimentation-floatation test, protozoal activity and Gram's staining was done as early as possible by standard methods as described by Smith *et al*[6].

STATISTICAL ANALYSIS

The data was subjected to appropriate statistical analysis using SPSS software. Data is presented as Mean±S.E. at the significance level, $p \leq 0.05$.

RESULTS AND DISCUSSION

On clinical examination, all animals were in depressed condition and rumination was suspended in all cases. The muzzle was dry. On visual examination of abdomen contour from the rear side, 11animals had bilaterally distended abdomen, while 13 animal had unilaterally distended (left side) while rest of the animals were with normal abdominal contour. Unilateral or bilateral abdominal distension was reported in animals suffering from intestinal obstruction by Dennison[7] *et al.* and Kushwaha[8] *et al.*

Ileus was the most common finding of intestinal obstruction which may also result in atony of gastrointestinal tract including rumen and abomasum (may be due to gastro-ileal and abomasal reflux), and also in small and large intestines. Role of some excitatory and inhibitory factors in controlling ruminal motility has been described by various scientists[9,10]. Whatever the cause (traumatic or non-traumatic) of ileus, common symptoms are manifested by animals.

Clinical characteristics of buffaloes affected with non traumatic gastrointestinal tract atony are depicted in table 1. Age of affected animals was 5.67±0.44 years. These results were found similar with the results of Dharmaceelan *et al.*[11] and Kushwaha *et al.*[8]. Higher incidence of intestinal obstruction in this age group could be due to intramural mass, impacted feed material, peritonitis, abscessation, intussusception, volvulus and torsion as reported by Makhdoomi *et al.*[12].

Mean value for post parturient status was found to be 45.1±16.10 days in affected animals. Three animals were found to be

recently calved (1-2 weeks). Radostits *et al*[13]. reported high occurrence of caecal dialatation and volvulus after recent parturition. They also stated that high occurrence found in well fed and high producing dairy cows ageing 3-5 years. Reported mean value for pregnancy status was 0.81±0.52 months. Cases of advance pregnancy were not included in this study because lot of scientists consider gastrointestinal tract atony cases in advanced pregnancy as vagal nerve origin (type IV vagal indigestion). Kumar[14] found that pregnancy was not related with intestinal obstruction except in cases of peritonitis where recent parturition history reflects internal injury as source of infection. Significantly high level of blood histamine has been reported in normal calving buffaloes after the stress of parturition as compared to immediately before parturition[15].

Mean value for milk yield in sick animals before illness was reported to be 7.5±1.1 litres/day. But during illness drastic reduction up to zero liters/day was reported in all the affected cases.

Mean value for duration of illness of all affected animals was found to be 10.86±1.08 days. This value is close to mean duration of illness (7.30±0.51), which was reported by Kumar[14] in cases of intestinal obstructions.

Some degree of inappetance or anorexia was observed in all the affected animals. Reported mean value for inappetance or anorexia was 9.1±01.09 days. In this study 27 (83.33 per cent) animals were reported to be anorectic, while inappetance recorded in 23 (16.67 per cent) animals. Hans Raj[16] reported that substantial increased quantities of histamines and other amines in reticulo-rumen and their detection by chemo-receptors in rumen epithelium or absorption in rumen or in lower intestine might have caused reduction in feed intake in buffaloes. Histamine also acts as neuro-transmitter via hypothalamo-hypophyseal portal system and inhibits the release of hormones from pituitary gland[17] which adversely affects digestibility[18]. Out of 50 clinical cases colic signs were observed in 30 cases (60 per cent) while in remaining 20 cases either signs were absent or they were not observed by animal owners/handlers. History of episodes of pain was observed at least once rather than persistent finding. Mestry *et al*.[19]. reported colic signs in animals suffered with small intestinal faecolith obstructions. Walker[20] observed severe signs of pain in cases of small intestinal intussusceptions. Fubini *et al*.[21]. also reported signs of abdominal pain in large intestine obstruction cases. Indolence histories after few hours of episodes of colic were also observed in all animals in this study.

Absence of faeces was reported in 70 per cent affected animals while 30 per cent cases were passing reduced/scanty amount of faeces. In this study 13 cases which were observed with scanty hard faeces covered with digested blood and mucus were suspected for small intestine atony. Cases passing only mucus without faeces and digested blood were suspected for proximal small intestine atony (n=7). In rest of the affected animals either faeces was not observed per-rectally or scanty hard faeces with or without mucus was observed. Kumar[15] observed loss of defecation with or without mucus in 95.1 per cent animals. He also observed two animals which were passing tarry colored scanty faeces. Fubini *et al*.[21]. reported constipation and small amount of mucoid faeces in cases of intestinal obstructions. Cessation of faeces as a prominent clinical sign of intestinal obstruction has been reported[19]. Mean value for duration of constipation in all sick animals was recorded to be 7.12±0.72 days.

History of tympany was reported in 36 per cent affected animals. Kumar[14] did not reported tympany in 70.5 per cent cases suffering from faecolith either in small intestine or colon. Ruminal tympany was also reported by Braun *et al*.[22]. in bovines suffering from intestinal obstruction and this could be due to decreased ruminal motility.

EVALUATION OF RUMINAL FLUID

The findings of ruminal fluid evaluation in buffaloes affected with gastrointestinal tract atony are depicted in table 2. Evaluation of

ruminal fluid revealed characteristic alterations in physical chemical and microbial parameters. Ruminal fluid colour of almost all affected animals was found to be similar with colour of healthy ruminal fluid. Mean ruminal fluid pH of all sick animals was found toward alkalinity as compare to healthy animals. Viscosity of ruminal fluid was found to be watery in most of animals in comparison of healthy animals. Typical aromatic ruminal fluid odour was replaced by weak aromatic odour in all affected animals. Recorded MBRT for ruminal fluid of healthy animals was < 6 min. MBRT recorded for ruminal fluid of all the affected animals was > 10 min (in 31 cases), < 6min (in 5 cases) and 6-10 min (in 14 cases). Time for SFT in ruminal fluid of healthy animal was reported as < 8 min. Time for SFT in ruminal fluid of all affected animals was found to be > 10 min (in 24 animals), 8-15 min (in 20 animals) and < 8 min (in 6 animals). Multiple active protozoa were observed in ruminal fluid of all healthy animals. Protozoa activity was observed in ruminal fluid of all sick animals as few small sized protozoa with sluggish activity (in 29cases), several medium sized protozoa with reduced activity in 6 cases and nil protozoal activity was observed in 15 cases. More Gram negative bacteria were observed in the ruminal fluid of affected animals through microscopic examination than in healthy animals. It was observed that Gram negative bacteria were replaced by Gram positive bacteria in 47 affected buffaloes and only three affected buffaloes were having more Gram negative as compare to Gram positive bacteria. Braun *et al.*[23]. also examined ruminal fluid in most of the cows affected with haemorrhagic bowel syndrome. Colour was found to be normal, pH (7.68±0.61), normal MBRT in 5 cows but was delayed MBRT in rest of the animals. Negative ruminal fluid examination tests could be due to reduced or absent microbial activity in affected animals.

Table 1: Clinical characteristics of buffaloes affected with non traumatic gastrointestinal tract atony (Mean±S.E. range and percentage of the parameters is presented)

Parameter	Mean	Range	Percentage
Age	5.67±0.44	1.5-10	-
Days since parturition (days)	45.1±16.10	0- 240	-
Pregnancy status (months)	0.81±0.52	0-4	-
Milk yield before illness (litres)	7.5±1.1	0-18	-
Milk yield during illness (litres)	0	0	-
Duration of illness (days)	10.86±1.08	2-60	-
Anorexia/inappetance (days)	9.1±1.09	2-30	-
Constipation	7.12±0.96	2-25	-
Colic signs	-	-	60
Absence of feaces	-	-	70
Scanty and hard feaces	-	-	30
Tympany	-	-	36

Table 2: Ruminal fluid examination in buffaloes affected with gastrointestinal tract atony

Sr. No.	Parameters	Severity level	GIT atony (n=50)	Control values
1.	Colour	Greenish - yellow	27 (54%)	Olive green-yellowish
		Yellowish – brown	6 (12%)	
		Yellowish	13 (26%)	
		Dark brown	4 (8%)	
2.	pH	6-7	5 (10%)	6-7
		7	10 (20%)	
		7-8	26 (52%)	
		8	9 (18%)	
3.	Consistency	Watery	41 (82%)	Viscous
		Slightly viscous	5(10%)	
		Viscous	4(8%)	
4.	Odour	Weak aromatic	43 (86%)	Aromatic
		Aromatic	7 (14%)	
5.	MBRT (min)	<6	3 (6%)	< 6 min.
		6-10	24 (48%)	
		>10	15 (30%)	
		Nil	6 (12%)	
6	SFT(min)	<8	7 (14%)	< 8 min.
		8-15	17 (34%)	
		>15	26 (52%)	
7	Protozoa activity	Many active	6 (12%)	multiple active protozoa
		Few less active	29 (58%)	
		Nil	15 (30%)	
8	Gram staining	Gram + bacteria	47 (94%)	More gram negative bacteria
		Gram – bacteria	3 (6%)	

Note -1) MBRT- Methylene blue reduction time, <6 min- active; 6-10min-reduced activity; >10 min- no activity.
2) SFT- Sedimentation-floatation test, <8 min – active fermentation; 8-15 min – reduced fermentation; >15 min – no fermentation activity

CONCLUSION

Findings of the clinical characteristics explored in the present study will be helpful in diagnosis of the disease in animals. Absence of defecation or reduced amount of feaces with or without melena along with colic signs are mainly found in the animals affected with gastrointestinal tract atony. Ruminal fluid analysis of such cases indicates slight alkaline ruminal fluid pH with watery consistency, weak aromatic odour, delayed methylene blue reduction test and sedimentation floatation test. Medium size protozoa with reduced activity or nil protozoal activities predominates in the animals affected with gastrointestinal tract atony.

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