CLINICAL, HEMATO-BIOCHEMICAL AND THERAPEUTIC STUDIES ON RUMEN IMPACTION IN BUFFALOES

A.K. Tripathi[1], J.S. Soodan[2] and R.B. Kushwaha[2]

ABSTRACT

Ruminal impaction was studied in buffaloes in and around Jammu region the majority of cases were of animals having ingested fibrous feed material, coarse grain, polythene and jute bags and ropes and nonpenetrating metallic objects. Prominent clinical signs noticed were complete cessation of rumination, impaction and atony of rumen, hardening and pelleted mucous coated dung, and inappetance to anorexia. Haematological alterations revealed reversal of neutrophil to lymphocyte ratio. The diseased buffaloes had significantly higher bilirubin, aspartate aminotransferase, glucose, blood urea nitrogen and creatinine, levels and significantly lower calcium, than the control values. The levels of alkaline phosphatase, total protein, albumin, globulin and phosphorus did not differ significantly from the respective control values.

Keywords: buffalo, haematology, biochemical, rumen impaction

INTRODUCTION

Rumen impaction mainly occurs due to feeding of poor quality hay, straw or roughages deficient in protein and readily digestible carbohydrate, overeating of young grasses, ingestion of mouldy or decomposed feed, polythene bags, ropes and other plastic materials, and exposure to hot and dry weather conditions (Radostits *et al*., 2010). The clinical signs include decreased rumen motility or rumen atony, abdominal distension, anorexia, constipated feces, occasional diarrhoea, normal to increased temperature, increased pulse rate, hard consistency of rumen and solid mass on left side on per rectal examination (Nwity and Chaudhary, 1995). Present study reports the clinical, hematobiochemical alterations and therapeutic studies in various cases of ruminal impaction in buffaloes.

MATERIALS AND METHODS

The study was conducted on twenty buffaloes suffering from ruminal impaction, presented at Division of Veterinary Clinic and

[1]Department of Clinical Medicine, College of Veterinary and Animal Sciences, UP Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan (DUVASU), Mathura, Uttar Pradesh, India, E-mail: arvindvet04@rediffmail.com

[2] Division of Veterinary Clinic and Teaching Hospital, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-J), R.S. Pura-Jammu, India

Teaching Hospital Faculty of Veterinary Sciences and Animal Husbandry SKUAST-J, R S Pura-Jammu during the study period from January 2008 to December 2010. The diagnosis of rumen impaction was done on the basis of hard consistency of rumen on per rectal examination (Grymer and Ames, 1981) and exploratory laparorumenotomy. Six apparently healthy buffaloes brought to the clinic for artificial insemination used for studying normal parameters.

Each animal was thoroughly evaluated for its general condition and hydration status. The physical parameters (rectal temperature, heart rate, and respiration rate, colour of mucous membrane, muzzle status, rumen consistency and rumen motility) were recorded at the time of presentation. Quantity and consistency of faeces in rectum, faecal colour, rumen consistency, and rumen size were recorded on rectal examination. Physical and microscopic examination of ruminal fluid was done for color, odour, concistency pH and protozoal motility (Garry, 2002).

Blood samples (2 ml) were collected aseptically from jugular vein in EDTA coated vials. Haemoglobin (Hb, g/dL), packed cell volume (PCV, %), total leukocyte count (TLC, per/µl) and differential leukocyte count (DLC, % and per/µl) were estimated by standard methods (Benjamin, 1985). For glucose estimation blood samples were collected in vials containing sodium fluoride.

Blood samples were also collected in acid free vials without any anticoagulant; serum was separated and transferred to a dry clean vial for storage at-20^{o}C till further evaluation. Following biochemical parameters were estimated using diagnostic kit with help of autoanalyzer viz Total bilirubin, aspartate aminotrasferase (AST), alkaline phosphatase (ALP), glucose, total protein, albumin, blood urea nitrogen (BUN), creatinine, calcium and phosphorus. The data were subjected to student's *t*-test and means and standard errors were calculated for comparison between control and animals with rumen impaction (Snedecor and Cochran, 1994).

Therapeutic management includes exploratiory ruminotomy to evacuate the rumen followed by fluid and electrolyte therapy, broad spectrum antibiotics, mineral oils, antihistaminics, NSAIDS and ruminotorics, ruminal cud transfer was done in some cases as and when required for restoration of normal ruminal flora.

RESULTS AND DISCUSSION

All the animals were in depressed condition and rumination was suspended, muzzle was dry. On visual examination of abdominal contour from rear side, all the animals had unilaterally distended (left side) abdomen, and moderate degree (8-10%) of dehydration. Ruminal motility (1.40±0.25 per 5 minutes) was reduced significantly compared to healthy control (8.50±0.30 per 5 minutes). No significant variation in rectal temperature and respiration rate were noticed in comparison to healthy control. However, heart rate (72.60±4.26 per min) was significantly higher than healthy control (57.80±3.08). No abnormal sounds were herd on auscultation of lung and heart. On per-rectal examination, the consistency of rumen was doughy to moderately hard in all cases, no distension or ballooning of intestinal loops and in majority of animals rectum was found empty and few having constipated dry feces (pellets). These signs are similar to those earlier reported by Nwity and Chaudhary (1995).

Physical and microscopic examination of rumen fluid in impaction cases revealed greenish brown to yellowish brown color, watery

consistency, and pungent odor, normal pH, poor (+) to nil protozoal motility in all cases, similar findings were reported by Garry, 2002. Exploratory ruminotomy was done in all the cases and it was revealed that impacted materials in majority of cases having ingested fibrous feed material, coarse grain, polythene and jute bags and ropes and nonpenetrating metallic objects.

Hematological studies revealed (Table 1) that mean TLC, and percent neutrophils were significantly higher whereas, the mean lymphocyte was significantly lower. However, no significant variation was observed in the Mean Hb, Mean PCV, in ruminal impaction cases than the healthy control. No variation in the Hb and PCV values in the ruminal impaction cases than healthy control animals were earlier reported by the Nagarajan and Rajmani, 1973. In the present study leukocytosis and neutrophilia were observed which might have resulted from chronic irritation of the forestomach wall by impacted feed materials, leaving the wall exposed to secondary infection, which resulted in inflammation (Hailat *et al*., 1996). Decreased lymphocytes could be due to release of corticosteroid as a result of stress (Feldman *et al*., 2000).

Biochemical studies revealed (Table 1) significantly higher mean Plasma values of total bilirubin, AST, glucose, BUN, creatinine, total protein, globulin and significantly lower mean plasma values of calcium in the ruminal impaction cases than healthy control. However, no

Table 1. hemato-biochemical alterations in buffaloes with rumen impaction.

Parameters	Control (Mean±SE), n=6	Rumen Impaction (Mean±SE), n=20
Hb (g/dl)	9.80±0.35	8.74±0.76
PCV (%)	28.70±1.20	278.40±4.84
WBC (x 10^3/µl)	5.45±0.56	8.65±0.38*
Neutrophil (%)	32.60±3.46	61.60±4.19*
Lymphocyte (%)	67.10±1.90	36.40±4.35*
N/L ratio	0.49±1.82	1.69±0.96*
AST (IU/L)	120.50±4.58	218.80±26.58*
ALP (IU/L)	168.40±8.24	178.40±25.20
Total bilirubin (mg/dl)	0.42±0.10	3.12±0.68
Glucose (mg/dl)	60.32±8.50	120.20±18.80*
BUN (mg/dl)	26.40±1.52	81.24±20.20*
Creatinine (mg/dl)	0.50±0.05	2.30±0.60*
Total protein (g/dl)	7.20±0.20	8.35±0.45
Globulin (g/dl)	3.48±0.14	4.40±0.24*
Albumin (g/dl)	3.72±0.15	3.94±0.20
Calcium (mg/dl)	11.32±0.24	7.65±0.82*
Phosphorus (mg/dl)	6.20±0.30	5.95±0.18

Means bearing *differ significantly at P≤0.05

significant variation in the mean plasma values of ALP, albumin and phosphorus were observed in the ruminal impaction cases than healthy control. The increased bilirubin level in present study may be attributed to absorption of toxic substances from rumen. Impaired uptake and excretion of bilirubin due to deranged liver function, as evident by increased liver enzymes, may have resulted in increased serum bilirubin concentration. The increased bilirubin may also be due to constipation and starvation (Kaneko *et al*., 2008). The possible cause of higher AST could be necrosis of liver due to toxemia from the damaged rumen mucosa (Garry, 2002). In rumen impaction the putrefied ingesta liberates toxic amines like histamine in rumen which after absorption into circulation increases BUN concentration (Dain *et al*., 1995). The increased BUN level could also be attributed to decrease in renal blood flow as a part of compensatory mechanism to maintain circulation in hypovolemia associated with dehydration (Kaneko *et al*., 2008) and same phenomenon may be held responsible for increased creatinine concentration. Moreover, during ruminal disorders there is failure of urea cycling process and urea is not utilized by rumen microbes (Singh *et al*., 2001). The increase in glucose level may be due to stress of impaction leading to adrenocorticosteroid release, which has glycogenolytic effect, causing hyperglycemia.

Hypocalcaemia may be due to less assimilation of feed materials as a result of long standing anorexia (Sethuraman and Rathore, 1979; Radostits *et al*., 2010). Daniel (1983) reported that both rumen and abomasal motilities were similarly reduced in hypocalcemia due to general effect of depression of levels of ionised calcium on smooth muscle contractibility. Similarly, reduced calcium level in present study may have contributed to decreased ruminal motility.

All the cases affected with ruminal impaction were treated successfully in a similar principle as suggested by Khose *et al*., 2010, with slight modification. Initially the left para lumbar fossa was prepared for aseptic surgery. The rumenotomy was performed as per standard technique to evacuate the impacted ruminal content and fresh rumen cud, along with 4 Rumentas (Rumenotoric bolus) were introduced into the rumen before closing it. The Laparotomy incision was closed as per standard technique. Post-operative management included Dextrose Normal Saline 10 liters I/V, Strepto-penicillin 5 gm I/M (7 days), Melonex 15 ml I/M, Anistamina 10 ml I/M and Tribivet 10 ml I/M for 3 days and Floratone 4 boli, Rumentas 2 boli orally bid for 7 days in each cases. Skin sutures were removed on the 10th post-operative day. All The buffaloes affected with ruminal impaction recovered uneventfully.

REFERENCES

Benjamin, M.M. 1985. *Outline of Veterinary Clinical Pathology*. Kalyani Publisher, New Delhi, India. p. 60-63, 71-75.

Dain, T.A, A.L. Neal and R.W. Dougherty. 1995. The occurrence of histamine and tyramine in ruminal ingesta of experimentally urea fed sheep. *J. Anim. Sci*., **14**: 930-955.

Daniel, R.C.W. 1983. Motility of rumen and abomasum during hypocalcemia. *Can. J. Compart. Med*., **47**: 276-280.

Feldman, B.F., J.G. Zinkl and N.C. Jain. 2000. Indigestion in ruminants. *In* Garry, F.B. (ed.) *Schalm's Veterinary Haematology*, 5th ed. Lee and Febiger, Philadelphia.

Garry, F.B. 2002. *Indigestion in ruminants,* p. 722-747. *In* Smith, B.P. (ed.) *Large Animal*

Internal Medicine, 2nd ed. Mosby, St. Louis and Baltimore.

Grymer, J. and N.K. Ames. 1981. Bovine abdominal pings. Clinical examination and differential diagnosis. *Compendium on Continuing Education of Practicing Veterinarians*, **3**: 311-318.

Hailat, N., S. Nouth, A. Al-Darraji, S. Lafi, F. Al-Ani and A. Al-Manjali. 1996. Prevalence and pathology of foreign bodies (plastic) in Awassi sheep in Jordan. *Small Ruminant Res.*, **24**: 43-48.

Kaneko, J.J., J.W. Harvey and M.L. Bruss. 2008. *Clinical Biochemistry of Domestic Animals*. 6th ed. Academic Press, London.

Khose, K.A., P.A. Jadhav and V.E. Mahajan. 2010. Ruminal Impaction in a Cow with Indigestible Foreign Bodies and its Surgical Management. *Intas Polivet*., **11**(2): 189-190.

Nagarajan, V. and S. Rajamani. 1973. Alkaline indigestion and rumen putrefaction in cow. *Indian Vet. J*., **50**: 1147-1151.

Nwity, T.N.E. and S.V.R. Chaudhary. 1995. Ruminal impaction due to indigestible materials in the arid zone of Borno state of Nigeria. *Pak. Vet. J*., **15**: 29-33.

Pienkowski, M. 1969. Estimation of the functional state of liver in cows with acid indigestion. *Annals universitatis, Marial CurieSkalodowska, Lublin Pulonia, Section*, **18**: 209-222.

Radostits, O.M., C.C. Gay, K. Hinchcliff and P.D. Constable. 2010. *Veterinary Medicine. A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs and Goats,* 10th ed. Saunders Elsevier.

Sethuraman, V. and S.S. Rathore. 1979. Clinical, haematological and biochemical studies on secondary indigestion in bovines due to traumatic reticulitis and diaphragmatic hernia. *Indian J. Anim. Sci*., **49**: 703-706.

Singh, N., R. Kumari and M.A. Akbar. 2001. Ruminal pH as a regulator of blood metabolites in lactating Murrah buffaloes. *Indian Vet. Med. J.*, **25**: 253-256.

Snedecor, G.W. and W.G. Cochran. 1994. *Statistical Methods*, 8th ed. Iowa State University Press. Ames. Iowa, USA.