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Evaluation of hepatic serumal enzyme activity in dairy cattle with cecum dilatation and twisting

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ABSTRACT

Cecum dilatation and twisting have been known as cases of intestinal obstruction in mature cattle. Cecum dilatation, with or without its twisting, occurs separately. The complication may be seen at any age but its most occurrence frequencies are in 4 to 7 years old cows. It seems that cecum dilatation occurs before its twisting. The reason of cecum dilatation is not clear but its pathogenesis is similar to the abomasum displacement as a result of granular dietary. The obstruction of cecum, colon, and/or rectum may cause dehydration without alkalosis. The aim of the present study is to examine the hepatic serumal enzyme activity in dairy cattle with cecum dilatation which can be used as factors for rapid diagnosis of cecum dilatation in industrial cow pens in order to prevent economical loses. In the present study after diagnosing of cecum dilatation of dairy cattle by rectal touching and clinical signs, 12 cows suffered from cecum dilatation and 12 healthy cows as control group were blood sampled. The sample serums were transferred to laboratory. The samples were analyzed using colorimeter, Pars Azmoon kits, auto-analyzer system (model Hitachi), and hepatic serumal enzyme activity which consist of ALP, AST and ALT. Results showed that the average of hepatic serumal enzyme activity rate is higher in cattle suffered from cecum dilatation compared with healthy cattle. This increasing is accountable considering dehydration because of anorexia and negative energy balance or increasing of lipid proxidation.

Key words: ALP, AST, ALT, cecum dilatation, dairy cattle

INTRODUCTION

Cecum dilatation and its twisting cause intestinal obstruction. In ruminant it occurs as a result of various factors. Constrictive intestinal damages, intra-intestinal tumors, external pressures on intestine, and etc. are some causes of intestinal obstruction. Fibrotic tenacities and tumors cause intestinal tightening followed by obstruction. Also some factors such as sclerosis a part of intestinal following a surgery, sever manipulation of intestines, shock, peritonitis, prolonged and continuous intestinal dilatation, intestinal diverticulitis, intestinal obstruction whencesoever (signs of obstruction are decrease or lack of feces, progressive dilatation of abdomen, and stomachache) cause intestinal dilatation and twisting [1].

The effects of intestinal obstruction are different based on type, location, and nature of obstruction. Most obstructions of initial part of small intestine cause more sever and acute syndrome compared with large intestine [2]. Also it must be mentioned that small intestine and colon obstruction in single-hoof animals cause livestock death

less than 24 hours while the same event in cattle doesn't cause the death before a week as well as cecum dilatation doesn't occur following obstruction. Intestinal dilatation and its twisting that cecum dilatation and twisting are part of which cause the loss of body fluids and in some more acute cases cause toxemia followed by cardiovascular consequences, peripheral blood circulation failure, and collapse [3, 4]. The aim of the present study is to examine fat profiles changes in dairy cattle suffered from cecum dilatation.

MATERIALS AND METHODS

12 cattle with cecum dilatation and 12 apparently healthy cattle as control group were blood sampling following diagnosis of cecum dilatation in dairy cattle by rectal touching and clinical signs. The samples were transferred to laboratory following to obtain their sera. The samples were analyzed using colorimeter, Pars Azmoon kits, auto-analyzer system (model Hitachi), and serumal hepatic enzyme activity which consist of ALP, AST, and ALT. Finally, obtained data were analyzed statistically using SPSS (Ver.15) and U Mann-Whitney test.

Results

Based on the information of table 1 and according to U Mann-Whitney test it is observed that the average rate of ALP in diseased cattle was 497.62±41.15 u/l and in healthy group was 384.68±48.48 u/l in which U=7, p=0.000, and reliability level = 99%. Therefore the observed difference in the average of ALP between two understudied groups was meaningful and this rate was greater in diseased animals (p< 0.01).

Table 1 – the average of ALP serum rate in two groups (healthy and diseased cattle)

group	number	Average	U	P-value
diseased	12	497/62 ± 41/15	7	0/000
Healthy	12	384/68 ± 48/48		

***U**: U Mann-Whitney test*

The average rate of ALT in diseased cattle was 51.09 ± 9.20 u/l and in healthy group was 30.605 ± 5.43 u/l in which U=1, p=0.000, and reliability level = 99%. Therefore the observed difference in the average of ALT between two understudied groups was meaning (p<0.001).

Table 2 – the average of ALT in two groups (healthy and diseased cattle)

group	number	Average	U	P-value
diseased	12	51/09 ± 9/20	1	0/000
Healthy	12	30/65 ± 5/43		

The average rate of AST in diseased cattle was 159.52 ± 20.25 u/l and in healthy group was 123.59 ± 12.48 u/l in which U=5, p=0.000, and reliability level = 99%. Therefore the observed difference in the average of AST between two understudied groups was meaning (p>0.001).

Table 3 – the average of serum AST in two groups (healthy and diseased cattle)

group	number	Average	U	P-value
diseased	12	159/52 ± 20/25	5	0.000
Healthy	12	1323/59 ± 12/48		

Based on table 4 and Kruskal Wallis test it is observed that the mean rate of serum ALP at 3, 4, 5, and 6 years old were 493.96 ± 9.96, 516.41 ± 33.09, 475.93 ± 59.09, and 497.75 ± - u/l respectively which was unmeaning based on x^2=3.51, meaningful level of p=0.319, and reliability level of 95% the observed difference in ALP rate in various ages of diseased cattle (p>0.05).

Table 4- comparison of serum ALP average (u/l) in diseased cattle based on age

Age	number	Average	X^2	df	P
3	2	493/96 ± 9/96	3/51	3	0/319
4	5	516/41 ± 33/09			
5	4	475/93 ± 59/09			
6	1	497 ± -			
total	12	479/63 ± 41/15			

The mean rate of serum ALT at 3, 4, 5, and 6 years old were 39.77 ± 0.41, 51.33 ± 8.98, 52.87 ± 6.69, and 65.40 ± - u/l respectively which was unmeaning based on x^2=6.38, meaningful level of p=0.094, and reliability level of 95% the observed difference in ALT rate in various ages of diseased cattle (p>0.05).

Table 5- comparison of serum ALT average (u/l) in diseased cattle based on age

Age	number	Average	X^2	df	P
3	2	39/77 ± 0/41	6/38	3	0/093
4	5	51/33 ± 8/98			
5	4	52/87 ± 6/69			
6	1	65/40 ± -			
total	12	51/09 ± 9/20			

The mean rate of serum AST at 3, 4, 5, and 6 years old were 137.95 ± 7.54, 157.26 ± 18.44, 166.22 ± 19.94, and 187.18 ± - u/l respectively which was unmeaning based on x^2=4.61, meaningful level of p=0.202, and reliability level of 95% the observed difference in AST rate in various ages of diseased cattle (p>0.05).

Table 6- comparison of serum AST average (u/l) in diseased cattle based on age

Age	number	Average	X^2	df	P
3	2	137/95 ± 7/54	4/61	3	0/202
4	5	157/26 ± 18/44			
5	4	166/22 ± 19/94			
6	1	187/18 ± -			
total	12	159/52 ± 20/25			

DISCUSSION

Cecum dilatation and its twisting is a prevalent problem at industrial cow pens which imposes a great lose to owners, so fast and timely diagnosis can prevent economical losses. Although conclusive diagnosis is conducted by clinical signs, rectal touching, and laparectomy, laboratory tests are useful. It was recognized, by library searches and examining indices, which the only significant laboratory factors about the disease consist of the changes of serum electrolytes especially chlorine, potassium, as well as examination the changes of hematocrit in chronic condition; of course electrolyte disorders depends on obstruction location [5, 6]. Obstruction near the duodenum and pylorus cause problems in passing abomasum secretions; so, result in hypochloremia, hypocalcaemia, metabolic alkalosis. Cecum, colon, or rectum obstruction maybe causes dehydration without alkalosis. If intestine affected by necrosis or rupture, acidosis will be occur because of blood circulation collapse which results in peritoneum inflammation and toxins absorption [7].

There is not a similar study about the serum activity of liver enzymes which results in cecum dilatation. Only in a study on cecum dilatation and twisting of a 6 month Holstein cow, the increase of WBC rate and banded neutrophils was mentioned and there was no report about changes of serum biochemical factors except decrease in magnesium [8]. By reviewing the obtained results of the present study it was recognized that the average of serum activity of liver enzymes in diseased cattle is higher compared with healthy cattle; that higher rate was meaningful about all three enzymes that is ALP, ALT, and AST. The increase is accountable because of anorexia and dehydration, whilst diseased cattle encountered with metabolic shift and negative energy balance in which condition enzyme leakage to serum is accountable because of liver activity increase, fat peroxidation and realizing large amount of free radicals, and liver cells damage. In a study which has been conducted on cattle suffered from abomasum displacement, it has been mentioned that there was a meaningful increased of serum AST and GGT enzymes in diseased cattle [3, 9]. In the present study any meaningful difference was not observed about the average of serum activity of liver enzymes in diseased cattle based on their age and disease onset date. In spite of this, in comparing the average of understudied serum factors' activity according to cattle's pregnancy or unpregnancy it was cleared that AST is higher in pregnant cattle compared with unpregnant one; its reason is to need the more energy by pregnant cattle followed by more lipid peroxidation and consequently more liver cell damage which results in more enzyme leakage to serum.

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