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Original Research Article

Floppy Kid Disease: Diagnostic and Therapeutic Approach in Kids Suffering from FKD in Northern Cyprus

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ABSTRACT

Floppy Kid Disease (FKD) is a condition which is characterized with metabolic acidosis, generalized anorexia and muscle weakness that can be seen in young goat kids. During the course of an investigation on goat kids suffering from muscle weakness and increased deaths in a goat farm in Cyprus, 10 kids were evaluated. Hematological and biochemical examinations were performed for clinically depressive 5 kids. Also, blood gas analysis were performed for clinically depressive other 5 kids on the next day. As a result of the evaluation, blood pH values of 3 kids were 7.35, 7.33 and 7.26 in blood gas analysis and in addition to that base excess values of these kids were -3.90, -4.0 and -6.8, respectively. Furthermore, BHB values of these kids, which can be generated as a mid-product of D-Lactate, were high and especially the kid with a pH value of 7.26 had BHB level of 160 µmol/L. Following the treatment, only 2 kids died during 1 month of follow-up treatment. This study emphasizes the importance of metabolic acidosis and related parameters in diagnosis of FKD. In general, separation of kids from nannies and giving them oral bicarbonate were thought to be effective for Floppy Kid Disease.

Keywords: Acidosis, D-Lactate, Kid, Bicarbonate
Abbreviations: BE: Base excess, FKD: Floppy Kid Disease, BHB: beta-Hydroxybutyric acid

INTRODUCTION

Floppy Kid Disease (FKD) is first described in 1980s and is characterized with metabolic acidosis in young kids. Disease is characterized with anorexia, depression, weakness, poor muscle tone, poor suckle response and ataxia, especially in the first two weeks of kids after birth **(**Tremblay *et al.*, 1992; Harris *et al.*, 2009; Cebra and Cebra, 2012).

This study describes biochemical and hematological status in kids suffering from FKD in a goat herd in Northern Cyprus.

MATERIALS and METHODS

This study was conducted in the town of Northern Cyprus, Catalkoy-Kyrenia. As a result of increased kid deaths in a dairy goat farm; the owner applied to Near East University, Faculty of Veterinary Medicine Animal Hospital. The herd consisted of a total of 800 Damascus female kids and 300 young kids. During examinations in herd; 10 kids were detected as clinically depressive and clinical, hematological and biochemical examinations (Table 1) were performed in 5 of them and moreover, biochemical examination and blood gas analysis (Table 2) were performed for the remaining 5 kids on the other day.

Kids were staying freely under their nannies for all day long and in addition to that there were open water sources which were supplied during daytime. All kids were administered hyperimmune serum and vitamin E-Selenum injections right after they were born and they were also given vitamin E-Selenium injections one week after the birth. All kids were held in the same housing conditions and they were staying in half-open corrals. No synchronization protocol was applied to animals and rutting was achieved after releasing buckling into nannies.

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Table 1. Results of some serum biochemical parameters belong to first cases.

Serum Parameters	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10	Case 11	Case 12	Mean (±) SE	Ref. Values
Alb (g/dL)	2.18	2.21	1.92	2.24	2.00	1.95	2.17	1.91	2.04	1.94	2.30	2.15	2.083±0,04	2.70-3.90
AST (U/L)	75.15	64.75	83.95	87.46	132.76	83.20	72.90	101.86	100.96	124.64	65.60	70.79	88.66±6,43	60.00-147.00
CK (U/L)	317.70	133.27	327.69	326.46	244.14	319.86	277.26	145.51	271.59	260.04	316.11	146.81	257,20±21,6	113.00-446.00
Cl (mmol/L)	111.00	122.00	116.00	112.00	106.00	100.00	113.00	104.00	111.00	100.00	109.00	110.00	109,5±1,83	102.00-116.00
GGT (U/L)	52.49	85.50	82.52	71.30	87.60	71.98	62.15	58.61	55.10	60.50	71.06	49.56	67,3±3,75	24.00-66.00
Creat (mg/dL)	0.89	0.87	0.50	0.67	0.75	0.33	0.57	2.32	1.37	0.60	1.31	1.50	0,9±0,16	1.00-1.80
K (mmol/L)	5.50	5.10	5.60	5.50	7.00	5.60	5.50	4.7	4.00	3.40	4.20	4.00	5,00±0,28	4.20-6.00
LDH (U/L)	347.20	226.43	259.69	383.93	402.63	304.18	300.67	842.23	374.77	355.02	311.10	320.41	368,96±45,47	221.00-403.00

Table 2. Result of blood gas analysis belong to last 5 kids.

Parameters	Case 8	Case 9	Case 10	Case 11	Case 12	Reference Values
pH	7.41	7.35	7.41	7.26	7.33	7.32-7.54
pCO_2 mmHg	41.10	39.10	43.70	44.20	41.60	37.00-44.20
pO_2 mmHg	33.50	22.00	16.50	24.70	20.10	48.80
$cHCO_3^-$ mmol/L	26.40	21.70	28.00	20.10	21.90	22.30-27.70
BE	1.90	-3.90	3.50	-6.80	-4.00	-2.50 - +2.50
cSO_2 %	65.40	34.80	23.40	36.30	28.80	-
Na (m)	142.00	145.00	138.00	141.00	144.00	142.00-155.00
iCa (mg/dl)	1.04	1.32	1.19	1.36	1.33	4.00-4.60
$cTCO_2$ (mmol/L)	27.70	22.90	29.40	21.50	23.20	23.40-29.00
Anion Gap (with K)	16.00	16.00	13.00	16.00	16.00	13.20-21.00
Glucose (mg/dl)	47.00	153.00	50.00	70.00	70.00	50.00-75.00
BHB (mmol/L)	0,11 (110 µmol/L)	0.04 (40 µmol/L)	0.08 (80 µmol/L)	0,16 (160µmol/L)	0.09 (90 µmol/L)	-
Lactate (mmol/L)	2.69	1.55	2.21	0.69	1.23	-

RESULTS

It was reported that 80 of baby kids have died during the birth period in May (26.6%). There were no deaths in the previous birth season. Age of death kids ranged between 1 day and 10 days old. Only 2 of the dead kids were 19 and 21 days old.

Clinical complaints were observed in 2-21 days old kids and clinical course in dying kids were 3-4 days. Diseased kids had weakened and they were reluctant to move (Fig. 1) and in some kids there were swelling at metacarpal and metatarsal joints. In their physical examinations; their body temperature was between 39.7-40.4 ◦C. There was no dehydration and diarrhea. As a result of macroscopic necropsy examination of 4 dead kids; abomasum of all kids were filled with gas, there was also gas formation in bowels of 2 kids. (Fig. 2). In addition to these findings; there was bloody content in jejunum of one animal. Other clinical parameters were in normal range. Leukocytosis was observed in only one kid during hematological examination and other hematological parameters were within normal limits. During blood gas analysis; pH values of 5 kids were between 7.26-7.41 (Table 2). Base excess values were between +3.5- (-6.80). AST and CK levels were normal. Evaluation on the basis of GGT levels; passive transfer failure table was not detected (Yalcin *et al.*, 2010).

Figure 1. Intestinal gas formation in Case 11.

Figure 2. Clinical appearance in case 11.

DISCUSSION

Morbidity of the disease can reach up to 100% in some farms and high mortality rates were observed in some herds without treatment (Harris *et al.*, 2009). In our study; the disease presented itself without diarrhea among our kids and after that death ratios were 26.6%. Besides; disease was presented later on about 40% of our kids. The absence of death in the previous birth season and birth mortality observed especially in the month of May were consistent with the classical knowledge (Cebra and Cebra, 2012).

In kids; white muscle disease, which is characterized with muscular dystrophy, is very important. For diagnosis, in addition to clinical findings; CK and AST activities are also important. For the diagnosis of white muscle disease in kids, CK level should be above 1000 IU/L (Harris *et al.*, 2009). In this study; CK level of kids were between 327.69-145.51 IU/L. As selenium and vitamin E injections have been administered regularly to these animals and CK levels were under the specified level; white muscle disease could be eliminated in these animals. There are many studies about a correlation between GGT level and total IgG concentration for detecting the failure of passive transfer (FPT) in kids and lambs (Howard *et al.*, 2005; Yalcin *et al.*, 2010). Based on these researches, while GGT level of two kids in this study was evaluated, mild FPT was observed. Prophylactic *Escherichia coli* combined vaccination was applied to nannies before birth and as there was only two mild FPT cases in goat kids, additionally no diarrhea was observed in herd; we thought that colostral management in herd was good.

One of the diagnostic criteria for FKD is metabolic acidosis without diarrhea. D-lactatemia is responsible for this situation, also reduced H^+ ion excretion due to decreased kidney functions due to dehydration can be responsible for this situation too (Harris *et al.*, 2009; Cebra and Cebra, 2012). L-Lactate level which is different from D-lactate value, can be increased as a result of hypoxia (Omole *et al.*, 2001; Temizel *et al.*, 2009). In a study of Bleul *et al.* (2006); L-lactate level in kids with FKD was found to be lower than normal kids but on the other hand D-lactate level was higher in these kids when compared with control group. In this study; when L-Lactate level was compared with control data of previous study by Bleul *et al.* (2006); it was low in only one animal. Besides low pH level (7.26) of this kid was also notable. L-lactate levels of other kids were within normal limits (Temizel *et al.*, 2009). In a study of Hoversland and Parer (1974), blood gas analysis were compared with results in normal pregnant pygmy kids and blood pH of two kids were under normal value and blood pH of one kid was at limit value. Moreover; as BE values of kids with pH value of 7.33, 7.35 and 7.26 were -3.9, -4.0 and -6.8, respectively; this also supported metabolic acidosis presentation.

In studies about FKD; the bacteria in the intestinal flora were found to be responsible for increased D-Lactate levels (Bleul *et al.*, 2006; Lorenz and Gentile, 2014). D-lactate, which is produced in intestinal area, is converted to organic acids then topropionate, eventually these organic acids are absorbed and converted to β-hydroxybutyrat (BHB) in liver. In a study of Bleul *et al.* (2006); BHB level in kids with FKD was found to be

higher than that of control group. In the presented study; BHB analysis in 5 kids showed that BHB values was 40 μmol/L in only one kid and in other kids BHB values were 80, 90, 110 and 160 μmol/L respectively. In the study of Bleul *et al.* (2006); mean value of BHB in healthy kids was 67 μmol/L. In the basis of the study of Bleul *et al.* (2006); high BHB values especially in 2 kids with low pH values were supported by positive correlation with D-lactate level.

For the treatment of FKD; individual feeding after separating from mother is recommended in addition to intravenous or oral bicarbonate applications (Harris *et al.*, 2009; Cebra and Cebra, 2012). In a study of Tremblay *et al.* (1991); intravenous bicarbonate administration was found to be effective for alleviation of clinical signs in animals. In the presented study, 4 g of baking soda was given to each kid in addition to other applications and kids were separated from their mother. Deaths in herd was recorded during 1 month period and the number of death kids after treatment was reported as 2.

In conclusion, FKD should be kept in mind as an important cause of kid deaths which is an important problem in livestock rising. Especially in herds with older and overfed kids; appropriate measures should be taken. Although metabolic acidosis is golden standard in diagnosis of the disease; future studies should be made about the importance of parameters such as D-lactate level and BHB level.

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