International Journal of Science, Environment and Technology, Vol. 6, No 6, 2017, 3377 – 3381

ISSN 2278-3687 (O)
2277-663X (P)

HAEMATO-BIOCHEMICAL CHANGES ASSOCIATED WITH DILATED CARDIOMYOPATHY IN DOGS – A RETROSPECTIVE STUDY

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Abstract: Dogs with dilated cardiomyopathy were included in the present study. Various haemato-biochemical parameters red blood cell count (RBC), haemoglobin (Hb), volume of packed red cell (VPRC), total white blood cell count (TC), differential blood count – granulocyte, lymphocyte and monocyte, platelet count, blood urea nitrogen (BUN), creatinine and creatine kinase –MB, sodium, potassium and chloride of dogs affected with dilated cardiomyopathy were studied. The values obtained were compared with apparently healthy dogs.

Keywords: creatinine, CK-MB, dilated cardiomyopathy.

Introduction

In the early seventies, dilated cardiomyopathywas known as congestive heart failure where cardiac chambers were dilated with no other clinically important cardiovascular pathology. Cardiomyopathies were defined as diseases of the myocardium which led to cardiac dysfunction or failure. It was classified based on different pathophysiological or etiological and pathogenic factors (Dukes-McEwan *et al.,* 2003). Dilated cardiomyopathy was further defined as primary myocardial disease of unknown etiology characterized by dilatation of ventricle or atrium or both with reduction in contractility (O' Grady *et al.*, 2004). The present study was conducted to record the haemato-biochemical changes in dogs with dilated cardiomyopathy.

Materials and Methods

The study was carried out in the Department of Veterinary Clinical Medicine, Ethics and Jurisprudence, College of Veterinary and Animal Sciences, Mannuthy, Kerala Veterinary and

*Received Nov 2, 2017 * Published Dec 2, 2017 * www.ijset.net*

Animal Sciences University during the period July, 2015 to July, 2017. It was conducted in dogs that were apparently healthy and those with signs of cardiomyopathies presented to the small animal medicine outpatient unit of University Veterinary Hospital and Teaching Veterinary Clinical Complex, Mannuthy.

A total of twenty apparently healthy dogs of different age, breed and either sex were used as control (group I) and twenty-five cases of dilated cardiomyopathy irrespective of age, breed and sex were used for the present study (group II). Dilated cardiomyopathy were confirmed based on the clinical examination, electrocardiographic, radiographic, haemato-biochemical, blood gas and echocardiographic studies. For haemato-biochemical studies 10 ml of blood was collected aseptically from each animal and immediately after collection, 2ml of blood was transferred to EDTA vial, 4ml of blood was transferred to heparin and 4ml of blood transferred to vial containing serum clot activator.

Blood samples of apparently healthy animals and dogs with dilated cardiomyopathy were subjected to haemato-biochemical examinations. Haematological parameters – red blood cell count in 10^6/µl, haemoglobin (Hb) in g per cent, volume of packed red cell (PCV) in per cent, total white blood cell count (TC) in 10^3/ µl, differential blood count in per cent and platelet count in 10^3/ µl were estimated. Biochemical parameters- blood urea nitrogen (BUN) in mg/dl, creatinine in mg/dl and creatine kinase –MB in IU/L. Electrolytes- sodium, potassium and chloride (mmol/L) were also estimated.

Two ml whole blood was collected into NexGen vacutainer tubes with K2 EDTA by following the standard sample collection techniques. ORPHEE Mythic 18 Vet CBC Machine was used for the analysis.

A kinetic enzymatic method based CORMAY LiquickCor-UREA mini kit was used for blood urea nitrogen estimation. Modified Jaffe`s method based CORMAY LiquickCor-CREATININE mini kit was used for creatinine estimation. An optimised kinetic method based COMRAY LiquickCor- CK mini kit was used for CK-MB estimation.

'Epoc Reader blood analysis' working on the principle of potentiometry was utilized for the blood gas analysis. The analyser was loaded with fresh blood immediately after collection.

Results

The results of various haemato-biochemical parameters of group I and group II are given in tables below.

Table 1. Haematological values of control and dogs with dilated cardiomyopathy

Haemogram	Group I Control (Apparently healthy animals) (n=20)	Group - II Dilated cardiomyopathy (n=25)	t-value	p-value
Erythrocyte count ($x10^6\mu L$)	5.47±0.06	5.28±0.23	0.816^{ns}	0.421
Hb (g/dl)	11.33±0.25	11.06±0.52	0.449^{ns}	0.657
VPRC (%)	37.05±0.44	30.63±1.29	4.116^{**}	<0.001
WBC ($X10^3\mu L$)	13.81±0.56	16.66±1.12	2.262^{*}	0.030
Lymphocyte (%)	24.26±1.51	17.02±1.30	3.638^{**}	0.001
Monocyte (%)	5.93±0.34	4.72±0.48	1.926^{ns}	0.061
Granulocyte (%)	69.48±1.71	78.36±1.72	3.597^{**}	0.001
Platelet ($X10^3\mu L$)	2.53±0.12	2.69±0.26	0.550^{ns}	0.586

*-significant at p≤0.05 and ** significant at p≤0.01 ns: non-significant at 0.05

Table 2. Serum biochemical values in control and dogs with dilated cardiomyopathy

Serum Biochemistry	Group I Control (Apparently healthy animals) (n=20)	Group - II Dilated cardiomyopathy (n=25)	t-value	p-value
BUN (mg/dl)	20.75±0.68	23.47±0.96	2.173^{*}	0.035
Creatinine (mg/dl)	1.30±0.04	1.51±0.08	1.879^{ns}	0.067
CK-MB (IU/L)	20.23±0.31	155.23±13.75	9.815^{**}	<0.001

*-significant at p≤0.05 and ** significant at p≤0.01 ns: non-significant at 0.05

Table 3. Electrolyte values in control and dogs with dilated cardiomyopathy

Electrolytes	Group I Control (Apparently healthy animals) (n=20)	Group - II Dilated cardiomyopathy (n=25)	t-value	p-value
Sodium (mmol/L)	144.66±0.77	146.32±0.92	1.335^{ns}	0.189
Potassium (mmol/L)	4±0.04	4.35±0.06	4.360^{**}	<0.001
Chloride (mmol/L)	101.40±0.51	103.84±0.59	3.028^{*}	0.004

*-significant at p≤0.05 and ** significant at p≤0.01 ns: non-significant at 0.05

Discussion

In the current study, statistically significant (p≤0.01) decrease in the mean values of volume of packed red blood cells and lymphocyteswas recorded. Statistically significant increase was noticed in the mean values of granulocyte (p≤0.01) and total leucocyte count (p≤0.05). Several authors had reported similar findings (Farabaugh *et al.*, 2004), Martin *et al.* (2009) and Sesh *et al.* (2014).

No significant difference was noticed in the mean values of total erythrocyte count, haemoglobin, monocyte and total platelet count between control and group II animals. Martin *et al.* (2009) did not observe any haematological abnormalities except in the level of volume of packed red blood cells in dogs with DCM.

In group II, statistically significant increase was noticed in the mean values of creatine kinase-MB (155.23±13.75IU/L)($p\leq0.01$) and blood urea nitrogen ($p\leq0.05$). Although no significant difference was noticed in the mean values of creatinine, borderline values were noticed in group II. Aktas *et al.* (1993) reported elevated levels of CK-MB in dogs with myocardial infarction. Kaenko *et al.* (1997) reported normal value of creatine kinase MB (CK-MB) of 19-25IU/L in dogs. Azotemia (increased BUN) was noticed by Tidholm and Jonsson (1996), McEwan (2000) and Martin *et al.* (2010). Dogs with dilated cardiomyopathy were highly prone for kidney failure through reduced cardiac output due to systolic failure. Renal arterial and renal blood flow was reduced due to secondary effects of low cardiac output (Thomason *et al.*, 2014). Therefore, frequent monitoring of kidney functions especially creatinine is essential in dogs affected with DCM.

In group II, statistically significant increase was noticed in the mean values of potassium ($p\leq0.01$) and chloride ($p\leq0.05$). Tidholm and Jonsson (1997) also found increased potassium level in dogs with DCM. No significant difference was noticed in the mean values of sodium.

Conclusion:

In the current study, statistically significant changeswere noticedin the mean values of volume of packed red blood cells, lymphocytes, granulocyte and total leucocyte count, BUN, enzyme CK-MB, potassium and chloride. In conclusion, enzyme CK-MB might be used to discriminate DCM cases especially with respiratory diseases.

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