



P-ISSN: 2349-8528
E-ISSN: 2321-4902
IJCS 2017; 5(4): 781-783
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Received: 25-05-2017
Accepted: 26-06-2017

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International Journal of Chemical Studies

Evaluation of hemato-biochemical profile in different age group of dogs affected with haemorrhagic gastroenteritis

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Abstract

Among the gastrointestinal disorders, haemorrhagic gastroenteritis (HGE) is the most common condition of multiple etiology, prevailing in all breeds of canine. The present study evaluates the alterations in the haematological and biochemical parameters in different age groups of dogs suffering from HGE. A total of fifty (n= 50) dog's suspected for HGE were selected and classified into two groups based on their age i.e., group-I (< one year) and group-II (\geq one year). Haematological and biochemical parameters of the both groups were estimated as per the standard procedures and analysed by student T- test (IBM®SPSS®Ver20.0 for Windows®). There was a significant decrease in the packed cell volume (PCV), total erythrocyte count (TEC), haemoglobin (Hb) and Potassium levels ($P < 0.001$). The changes in total leukocyte count (TLC), platelet count (PLT), blood urea nitrogen (BUN) alanine aminotransferase (ALT), glucose and sodium measured between the two groups were found statistically non-significant. It was found that, the deviation in normal hemato-biochemical parameters were more pronounced in group-I than group-II. In conclusion, the body physiological processes in canines with HGE were more affected at younger age indicating their prognostic importance.

Keywords: haemorrhagic gastro enteritis; haematological- biochemical parameters; prognosis

1. Introduction

Haemorrhagic gastro enteritis (HGE) is the most common problem of canine, which affects all age groups irrespective of breed. HGE has multiple etiology, which includes viruses like Parvo virus [1, 2], Rota virus [3] Corona virus [4], bacterial agents like *Salmonella* spp [5], *Esherichia coli* [6], *Clostridium* spp [7], endoparasites like *Ancylostoma caninum*, *Dipylidium caninum* [8], food allergies [9], irritant drugs [10] and consumption of some toxic substances. Most common clinical manifestation of HGE includes anorexia, dehydration, vomition and bloody diarrhoea. Since, HGE can occur in all age groups the present study was done to ascertain the haematological and biochemical profile alterations between two different age groups of affected dogs.

2. Materials and methods

A total of fifty (n=50) dogs in various ages suffering from haemorrhagic diarrhoea were considered for this study. Prior to the treatment, about 1ml of blood was collected aseptically in sterile syringes having disodium salt of ethylenediamine-tetra acetic acid and about 3ml of blood in sterile syringes with heparin from recurrent tarsal or cephalic vein. Haematological parameters were obtained by processing the EDTA added samples. Immediately after collecting blood in heparinised syringe, plasma was separated from the blood by centrifuging at 3000 rpm for 10 minutes, using this plasma all biochemical parameters were estimated. Packed cell volume (PCV), haemoglobin (Hb), total erythrocyte count (TEC), total leukocyte count (TLC) and platelets were determined by using standard methods [11]. Biochemical parameters like blood urea nitrogen (BUN), creatinine, glucose, alanine aminotransferase (ALT), total protein, albumin and electrolytes like sodium, potassium are estimated as per the procedure given in the commercial kits procured from Agappe diagnostics Ltd., using CECIL CE 2021 UV spectrophotometer. Globulin concentration was obtained by differencing the total protein and albumin concentration.

2.1. Statistical analysis

The data obtained were statistically analysed by using independent sample student T- test in SSPS software (IBM®SPSS®Ver20.0 for Windows®).

3. Results

In the present study, affected dogs with less than one year of age has low Hb(g/dl) (5.26±0.46), PCV (%) (21.54±1.81), TEC (X 10⁶/l) (2.71±0.13) and potassium(mmol/l) (3.34±0.15) values when compared to the Hb(g/dl) (8.16±0.48), PCV (%) (30.91±1.77), TEC (X 10⁶/l) (3.72±0.11) and

potassium(mmol/l) (4.02±0.17) values of affected dogs with more than one year of age. There is a change in the platelet count(X 10⁵/l) (group I-1.34±0.11; group II-1.61±0.15), glucose (mg/dl) (group I-85.82±4.99; group II-98.88±4.41), blood urea nitrogen (mg/dl) (group I-29.46±1.53; group II-25.85±2.09), ALT (IU/L) (group I-38.69±3.00; group II-31.51±2.48) and sodium (mmol/l) (group I-135.52±2.23; group II-141.48±2.08) was present between the two groups of affected dogs. When comparing the obtained data with the normal reference values, both groups of affected dogs have decreased Hb, PCV, TEC and potassium level.

Table 1: Hemato-biochemical profile in canine haemorrhagic gastro enteritis (Mean ± S.E.).

Parameters	Infected dogs (n=50)		Normal range
	Group-I Age (< 1 year) (n1=23)	Group-II Age (≥ 1 year) (n2=27)	
Hematological Parameters			
Hb (g/dl)	5.26±0.46**	8.16±0.48	12.0-18.0
PCV (%)	21.54±1.81**	30.91±1.77	37-55
TEC (X 10 ⁶ /l)	2.71±0.13**	3.72±0.11	5.5-8.5
TLC (X 10 ³ /l)	14.43±0.92	12.17±0.94	6.0-17.0
Platelets (X 10 ⁵ /l)	1.34±0.11	1.61±0.15	2.0-5.0
Biochemical parameters:			
Glucose (mg/dl)	85.82±4.99	98.88±4.41	60-125
Total plasma protein (g/dl)	5.98±0.16	6.15±0.10	5.0-7.2
Albumin (g/dl)	2.76±0.14	2.76±0.11	3.1-4.5
Globulin (g/dl)	3.22±0.03	3.39±0.14	2.8-4.5
A:G ratio	0.95±0.02	0.89±0.08	7-25
Blood urea nitrogen (mg/dl)	29.46±1.53	25.85±2.09	
Creatinine (mg/dl)	1.00±0.04	1.05±0.07	0.4-1.8
ALT (IU/L)	38.69±3.00	31.51±2.48	5-60
Sodium (mmol/l)	135.52±2.23	141.48±2.08	142-150
Potassium (mmol/l)	3.34±0.15**	4.02±0.17	3.7-5.4

** Significant at 1% level (P<0.01)

4. Discussion

Haemoglobin level of affected dogs with less than one year of age was low when compared to affected dogs with more than one year of age, possible reasons for this statistically significant decrease are heavy blood loss in vomition and diarrhoea, decreased erythropoiesis due to parvo viral infection [12], poor storage of iron due to improper assimilation, accumulation of toxic wastes during viremia [13] and also pre-existing poor health status. PCV and TEC were significantly decreased (p<0.01) in group-I which may be due to viral infections like parvo virus infection [14] and high blood loss. There was a non-significant increase in the TLC of dogs in group-I, this may be due to primary or secondary bacterial infections and also due to secondary response of bone marrow to infections leading to increased production of cells with shift to left. This finding also correlates with the results of other researchers [15, 16]. Platelets levels are non-significantly decreased in group-I, this may be due to loss of blood, increased destruction, decreased production, disseminated intravascular coagulopathy and parvo virus infection [17]. Hypoglycaemia in group-I might be due to anorexia and malabsorption from intestine [18, 19]. In the present study, there was a non-significant decrease in the total plasma protein level of group-I which might be due to decline in intake of food, malabsorption and increased permeability of intestinal

epithelium due to inflammation. Level of blood urea nitrogen was non-significantly elevated in group-I, this may be reduced glomerular filtration, as after which could be the reflection of reduction in renal blood flow which is concomitant to low PCV due to blood loss and dehydration. Elevated BUN may also be due to catabolic breakdown of tissues due to viral and bacterial infections [18]. This result matches with the observation of other authors also [20, 21]. Non-significant increase in ALT of group-I may be due to reactive hepatopathy, which could be because of circulatory changes and metabolic stress to the animal [22]. Potassium was significantly decreased while sodium was non-significantly decreased in group-I compared to group-II, this might be due to loss of electrolytes in diarrhoeic fluid [23]. Hypokalemia and non-significant hyponatremia due to diarrhoea has bearing over the cardiac function resulting in sympathetic stimulation of indirect blood pressure maintenance. This over all may further affect glomerular filtration rate and blood volume.

5. Conclusion

Packed cell volume (PCV), total erythrocyte counts (TEC), haemoglobin (Hb) and potassium level were significantly reduced in dogs with HGE of less than one year age when compared to dogs with HGE of more than one year of age. The changes in total leukocyte count (TLC), platelet count

(PLT), blood urea nitrogen (BUN) alanine aminotransferase (ALT), glucose and sodium measured between the two groups were found statistically non-significant. This shows that the deviation from body physiological process was more pronounced in dogs of less than one year of age compared to adults. So, these findings may help in formulating the therapeutic protocols when younger dogs are presented with HGE and also have prognostic importance.

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