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Haemato-biochemical alterations in canine Parvo Virus infection affected pups

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Abstract

The present study was conducted to monitor clinical, haematological and biochemical parameters in pups infected with canine parvovirus infection. A total of six apparently healthy and affected pups having age 12-15 weeks were brought to the Teaching Veterinary Clinical Complex having principal complaint of anorexia, frequent vomition, and foul smelling bloody diarrhoea were considered for the present study. Pups showed a significant decline in Hb, PCV, TEC and MCH. The values of AST, ALP increase and albumin level showed significant decrease whereas the levels of other biochemical parameters did not vary significantly.

Parvo viral hemorrhage gastroenteritis is one of the highly fatal infectious diseases of dogs caused by two distinct forms of parvo virus namely Canine parvo virus-2(CPV-2) which is the pathogenic form and Canine parvo virus-1(CPV-1) or the minute virus of canine (MVC). The first report of canine parvovirus enteritis was from USA (Eugster and Nain, 1977), while the identification and documentation of the causative agent was done in Canada by Appel *et al.* (1979). CPV-2 has spread globally to be estabilished as an endemic infection in domestic in domestic and wild canids (Parrish *et al.,* 1988). Like many other viruses, genetic evolution of CPV-2 has given rise to new antigenic types (Parrish *et al.,* 1991). Shortly after the emergence of CPV-2, two variant strains CPV-2a & CPV-2b have now completely replaced CPV-2 globally (Truyen *et al.,* 1996) and with the emergence of CPV-2c thereafter have compelled researchers for continuous monitoring of the dynamics of virus.

Among the various gastrointestinal disturbances, enteritis is the most common clinical condition encountered in all breeds and age groups of canine population (Bhat *et al.,* 2013). Amongst the viral etiologies responsible for gastroenteritis in dogs, canine parvovirus (CPV) is considered as the most pathogenic, CPV-2 spreads rapidly among dogs *via* faecal route or through oronasal exposure to fomites contaminated with infected faeces. Acute CPV-2 enteritis can be seen in dogs of any breed, age, or sex, but puppies between 6 weeks and 6 months are most susceptible (Pollock and Coyne 1993). The virus is known to cause myocarditis in young puppies and hemorrhagic gastroenteritis in older animals. The rapidly growing pups suffer from severe illness if they harbour intestinal parasites, protozoa and certain enteric bacteria (Banja *et al.* 2002).There are wide variations in the clinical signs in infected dogs as some show only symptoms of anorexia and mushy mucoid diarrhea while others reveal haemorrhagic enteritis and vomition. Therefore, the present study was undertaken to monitor clinical symptoms, related haematological and serum biochemical changes in experimentally induced canine parvoviral infection.

Materials and Methods

The present study was carried out at Teaching Veterinary Clinical Complex (TVCC) Department of Veterinary Medicine, College of Veterinary Sciences and Animal Husbandry, Selesih, Aizawl, Central Agricultural University, Mizoram. The pups were selected on the basis of having principal complaint of anorexia, frequent vomition, foul

smelling bloody diarrhoea along with polyuria, anuria, dysuria, anemia and halitosis. The pups brought to the TVCC for routine checkup and having proper vaccination and deworming status and normal clinico-physiological parameters were taken as healthy control. The animals were divided into two groups' viz. Gr.A (healthy dogs), Gr.B (canine parvovirus affected pups) comprising six pups in each group. Under clinical examination, the conjunctiva, oral mucosa, heart rate, pulse, respiration and temperature were recorded. The size and shape of chest and abdominal cavity were also determined. Eight ml of blood samples from each dog were collected from cephalic vein/saphenous vein. Two ml of blood was transferred to an EDTA vial for haematology estimation and 6ml blood was transferred to clot activator vial and serum was separated and kept in -20°C for future study. Haematological parameters viz. Hb, PCV, TEC, MCV, MCH, MCHC, RDW, TLC and DLC (Neutrophil and lymphocyte) were determined as per the standard procedure (Jain NC, 1986). The serum biochemical parameters viz. Total Protein, Albumin, Globulin, Albumin:Globulin (A:G ratio), Creatinine, Blood Urea Nitrogen (BUN), Asparatate transaminase (AST), Alanine transaminase (ALT), Alkaline phosphatase (ALP), Total bilirubin, Indirect bilirubin, Calcium, Phosphorus, Sodium, Potassium and Chloride were analysed by automated biochemical analyzer (Chem-7, ERBA Company Ltd.) with the help of commercial kits (ERBA company Ltd). Statistical analysis of the experiment data was carried out by using the methods described by Snedecor and Cochran (1967).

Results and Discussion

Alteration of Haemogram

There was significant ($P<0.05$) decrease in Hb, PCV, TEC and MCHC in Gr.B when compared to Gr. A (Table 1).But there was significant ($P<0.05$) increase in MCV in Gr.B dogs as compared to healthy dogs in present study (Table 2). Decreased levels of hemoglobin, total erythrocyte count and packed cell volume were also noticed by (Dharmadheeran *et al.* 2003), (Biswas *et al.* 2005), (Lee *et al.* 2012) and (Ali *et al.* 2014). Observed decrease Hb, PCV and MCHC in Gr. B might be due to anaemia in haemorrhagic gastroenteritis (Mohan *et al.* 1994), dehydration (Rai *et al.* 1994) and mechanical obstruction and massive sloughing of intestinal epithelial cells (Mallela *et al.* 2006), (Zafar *et al.* 1999), (Sagar *et al.* 2008) and decreased TEC might be due to damage of the capillaries of the villi of intestine of infected dogs (Haskins 1998 and Sagar *et al.* 2008).

Biochemical Analysis

Biochemical analysis in present study (Table 2) revealed that there was significant ($P<0.05$) increase of AST (76.33 ± 5.46 IU/L), ALP (114.44 ± 8.20IU/L) in Gr.B as compared to Gr.A (AST-58.28 ± 3.97IU/L and ALP-92.35 ± 6.85IU/L). The Albumin level in case of Gr.B (2.18 ± 0.53g/L) was significantly ($P<0.05$) decreased as compared to Gr. A (Table 2).The rest of the biochemicals did not show any significant alteration as compared to healthy dogs. These observations were in corroboration with the findings of (Dharmadheeran *et al.* 2003)and (Shah *et al.* 2013).Decrease in Albumin and increased AST in gastroenteritis infected dogs might be due to involvement of liver and severe protein losing enteropathy due to intestinal villi damage or intestinal haemorrhage (Grigonis *et al.* 2002). Increase in ALP might be due to hepatic hypoxia secondary to severe hypovolemia or the absorption of toxic substances due to loss of the gut barrier (Shah *et al.* 2013).

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Table 1. Haematologial parameters of healthy and Canine parvovirus affected pups Mean±SE

Parameters	Gr.A (n=6)	Gr.B (n=6)
Hb (g/dl)	15.28 ± 1.35	11.7 ± 1.71*
PCV (%)	44.53 ± 2.30	34.0 ± 6.94*
TEC (x106/µl)	6.96 ± 0.48	4.29 ± 0.34*
MCV (fL)	65.71 ± 6.83	78.71 ± 8.84*
MCH (pg)	22.07 ± 2.97	21.3 ± 1.99
MCHC (g/dl)	33.58 ± 2.80	27.65 ± 2.20*
RDW (%)	12.69 ± 0.48	13.1 ± 1.47
TLC (x103/µl)	11.88 ± 0.84	12.1 ± 1.55
Neutrophils (%)	72.58 ± 2.73	74.27 ± 2.38
Lymphocytes (%)	18.68 ± 3.33	18.68 ± 3.33

*P≤ 0.05

Table 2. Serum biochemical profile of healthy and Canine parvovirus affected pups Mean±SE

Parameters	Gr.A (n=6)	Gr.B (n=6)
AST (IU/L)	58.28 ± 3.97	76.33 ± 5.46*
ALT (IU/L)	31.96 ± 6.07	23.22 ± 5.21
ALP (IU/L)	92.35 ± 6.85	114.44 ± 8.20*
TB (mg/dl)	0.30 ± 0.17	0.23 ± 0.13
IB (mg/dl)	0.10 ± 0.08	0.18 ± 0.12
TP (g/L)	6.73 ± 0.19	5.63 ± 0.70
Albumin (g/L)	3.55 ± 0.40	2.18 ± 0.53*
AG Ratio	1.13 ± 0.24	0.66 ± 0.22
BUN (mg/dl)	14.26 ± 5.13	19.49 ± 5.02
Creatinine (mg/dl)	0.83 ± 0.36	1.06 ± 0.47
Ca (mg/dl)	8.76 ± 0.89	9.18 ± 1.31
P (mg/dl)	4.38 ± 0.35	5.42 ± 2.38
Na (mEq/L)	143.66 ± 9.13	141.68 ± 8.60
K (mEq/L)	4.53 ± 0.53	3.37 ± 1.20
Cl (mEq/L)	117.5 ± 5.52	102.11 ± 6.35

*P≤ 0.05

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