

Study on the Effect of Immunoglobulins in treatment of Canine Parvovirus infected Dogs

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Abstract

Canine parvovirus infection is one of the most common well-known diseases in dogs caused by CPV 2 strains with high morbidity and mortality rates. The present communication documents the effect of intravenous administration of immunoglobulin in the rise of leucocyte count in dogs with parvo viral infection. Confirmation of the canine parvovirus infection was carried out by the detection of CPV antigen in the faeces of dogs by chromatographic immunoassay principle and these dogs were negative for Canine Corona Virus (CCV) infection which was screened by chromatographic immunoassay principle diagnostic kit and negative for *Ancylostoma* infection by examine the microscopic examination of faecal samples. Six dogs aged between 2 to 6 months were selected to administer the purified immunoglobulin (@ 0.4 ml/kg body weight intravenously for three days) in addition to the symptomatic and fluid therapy. Therapeutic response was noticed by elevation in the leucocyte count on the fifth day of therapy. In conclusion, it is highly recommended the administration of immunoglobulin at the early stage of infection will be helpful in fast recovery and saving the dogs.

Keywords: Dogs, CPV antigen test, leucopenia, immunoglobulin

Canine parvovirus (CPV) infection is considered one of the oldest viral infections in dogs causing high morbidity and mortality in young dogs. Globally, CPV-2a, 2b and 2c are considered the most common parvovirus species causing disease in dogs (Prittie, 2004). Noticeable clinical signs in this were vomiting, abdominal pain, diarrhoea often with blood, severe dehydration and hypovolemic shock (Crawford and Sellon, 2010). Recordable haematological parameters were lymphopenia, neutropenia and leucopenia. Most commonly it is diagnosed based on clinical examination but it requires to differentiate CPV infection from the other conditions causing haemorrhagic enteritis including canine coronavirus infection (CCV) and *Ancylostoma* in young puppies. During the early stages of infection, leucopenia causes high mortality and dogs are prone to secondary bacterial infection (Saho *et al.*, 2007). Hence, the present study was carried out to assess the therapeutic effect of immunoglobulin administration over the leucocyte count in dogs.

The study was carried out on the dogs presented to the clinic with a history of passing bloody foul-smelling diarrhoea. Dogs in the present study belonged to different breeds, both sexes and aged between 2 to 6 months. Confirmation of the parvovirus

infection was carried out by the antigen detection test kit in the faecal samples. The antigen Rapid CPV/CCV test kit (Bionote Rapid CPV Ag/CCV Ag Canine test kit) is a chromatographic immunoassay for the qualitative detection of canine parvovirus antigen and coronavirus antigen in canine faeces. For assessing the efficacy of passive immunoglobulin therapy against CPV infection six dogs diagnosed with CPV infection was selected for the study. The procedure was carried out as per the manufactures instructions. Dogs with parvovirus infection were administered with injection ceftriaxone @ 25 mg/kg body weight once in a day, injection ranitidine @ 2 mg/kg body weight BID, injection ondansetron @ 0.5 mg/kg body eight BID, injection containing B complex vitamins, injection dextrose 5% and ringers lactate as per the dehydration status (Reddy *et al.*, 2015). An injection containing the liquid suspension of purified hyper immune immunoglobulin (Canglob- P ®) at the dose of 0.4 ml/kg body weight intravenously for 3 days was administered. Five millilitres of blood was collected into vacationers containing EDTA as an anticoagulant before therapy and after 5 days of therapy. The haematological parameters such as haemoglobin (g/dL), packed cell volume (%), total erythrocyte count ($\times 10^6/\mu\text{L}$), total leukocyte count ($10^3/\mu\text{L}$), differential leucocyte count, percentage of

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neutrophils, lymphocytes, eosinophils and monocytes were estimated as per the standard procedures. Dogs included in the present study were negative for Canine Corona Virus (CCV) infection which was screened by chromatographic immunoassay principle diagnostic kit and negative for *Ancylostoma* infection by examine the microscopic examination of faecal samples. Statistical analysis was carried out to record the statistical difference between before and after therapy of haematological parameters.

Dogs were selected for the study with positive canine parvovirus antigen by two lines in the CPV slot in the test kit and negative for CCV infection and *Ancylostoma* parasitic ova. Haematological changes before and after treatment is presented in Table-1. Earlier, in many studies immune-chromatography

based test kits were employed for the detection of parvovirus in faecal samples of dogs, since it is a rapid, simple, reproducible and sensitive diagnostic test (Filipov *et al.*, 2011). In the present study utilization of a rapid diagnostic test kits for the diagnosis of parvovirus infection used to isolate the infected dogs and to prevent the spread of infection further (Al- Tayib, 2014). Predisposing factors for the development of clinical disease were lack of protective immunity, intestinal parasites and malnutrition. The infection is spread by direct transmission from the oro-faecal route or by indirect transmission by the oro-nasal route through aerosols. The virus induced damage followed by secondary bacterial infection of intestinal mucosa of CPV affected dogs leads to septic shock (Behera *et al.*, 2015).

Table 1. Haematological changes in dogs with canine parvovirus infection

S.No	Parameter	Before therapy (Mean±S.E)	After Therapy (Mean±S.E)	P value
1.	Haemoglobin (g/dL)	7.12 ^a ±0.31	8.73 ^b ±0.44	0.004**
2.	Packed cell volume (%)	34.51 ^a ±0.48	27.02 ^b ±0.83	0.002**
3.	Total erythrocyte count (×10 ⁶ μl)	3.60 ^a ±0.18	4.54 ^b ±0.29	0.001**
4.	Total leucocyte count (×10 ³ μl)	2.68 ^a ±0.92	6.78 ^b ±0.81	0.001**
5.	Neutrophils (%)	51.02 ^a ±1.28	64.80 ^b ±2.08	0.038*
6.	Lymphocytes (%)	43.88 ^a ±3.08	29.29 ^b ±1.35	0.042*
7.	Eosinophils (%)	4.32±0.18	4.81±0.27	0.24 ^{NS}
8.	Monocytes (%)	1.88±0.22	2.03±0.09	0.32 ^{NS}

*P<0.05; **P<0.01; ^{NS}P>0.05; ^{abc} Columns bearing different superscripts differ significantly.

In the present study, reduced haemoglobin levels might be due to loss of blood due to gastric and intestinal haemorrhages (Biswas *et al.*, 2005) and it is a common finding in chronic infection due to suppression of erythropoiesis in the bone marrow (Goddard and Leisweitz., 2010). Elevated levels of packed cell volume were noticed during the infection due to severe dehydration. Reported haematological findings were in association with the previous reports on canine parvovirus infection of dogs by Yilmaz and Senturk (2007) and Castro *et al.*, (2013). During the chronic phase of the infection, leucocytosis may be noticed because of the invasion of the secondary bacterial infection. Reduced levels of total leukocyte count due to the destruction of leucocyte progenitor cells by the CPV virus (Goddard and Leisweitz,

2010). Reduced leukocyte count was noticed during the disease's conditions, due to this puppies may susceptible to other secondary complications (Reddy and Sivajothi, 2016). Green and Decaro (2012) documented that pups with very low leucocyte count may prone for high mortality. During the disease, correction of dehydration and re-establishment of circulating blood volume is important to prevent hypovolemic shock. Administration of intravenous immunoglobulin to dogs in the early stages of CPV infection helps to neutralize the virus present in the predilection sites in turn results in reduction of intestinal inflammation associated with the viral infection and also prevent the development of secondary bacterial infection. This is helpful in faster recovery of CPV affected dogs. In previous

studies, Saurtini *et al.* (2014) documented the effect of yolk derived immunoglobulin IgY intravenously in dogs with CPV-2 infection and noticed faster clinical recovery and to attain better weight gain. Administration of immunoglobulin Y (IgY) specific antibodies which were isolated from chicken egg yolk have the ability to neutralize the virus, so it cannot infect host cells and stops the viral spread. Previous study on immunoglobulin therapy for CPV

infection was carried out by Rishikesavan *et al.* (2021) in a dog but in their study laboratory assessment of post therapeutic response was not carried out. Improvement in the haemoglobin, packed cell volume and leucocyte count were noticed after treatment in the dogs selected for the study. There is a statistically significant difference noticed between before and after therapy which might be due to the provision of passive immunity against the CPV infection by the immunoglobulin administration.



Fig 1. Haemorrhagic diarrhoea – Common sign of canine parvovirus infection



Fig 3. Injection (Canglob- P ®) contains passive immunization against parvovirus infection

It is concluded the inclusion of specific immunoglobulin against canine parvovirus in the treatment regimen during the initial stages of infection will ensure the favourable recovery and prevent mortality.

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Fig 2. Positive test kit for parvovirus infection (Bionote Rapid CPV Ag/CCV Ag Canine test kit)

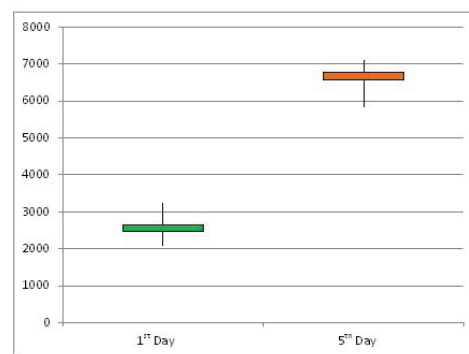


Fig 4. Graphical representation of leucocyte count before and after therapy in dogs with canine parvovirus infection.

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