Hematological Changes in Dogs with Parvovirus Enteritis in Thrissur District

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Abstract: Blood collected from thirteen dogs suspected of having canine parvovirus (CPV) were subjected to hematological analysis. Vomiting and hemorrhagic or blood-tinged diarrhea were the predominant clinical signs reported. Polymerase chain reaction (PCR) was carried out on fecal swabs obtained from above dogs to confirm presence of CPV infection. The most common hematological finding in all dogs was anemia. Leucocyte and platelet abnormalities were also observed. Monitoring of hematological changes prior to treatment can help decide on a better line of treatment thereby helping to increase the chances of survival in affected dogs.

Introduction

Canine parvovirus (CPV) has been a major cause of viral enteritis in puppies since its emergence in the late 1970s. The virus which was previously known as CPV-2 has now undergone several mutations and has been replaced by its variants namely CPV-2a, CPV-2h and CPV-2c. The common clinical signs suggestive of CPV enteritis are depression, anorexia, vomiting and diarrhea with or without blood.[6] Various authors have reported the presence of leucopenia, thrombocytopenia and anemia being the most characteristic alterations in the blood picture of CPV infected dogs.[2],[4],[10] Lymphopenia has also been reported in CPV infection.[2],[3] Hematocytopenia in affected dogs can help in giving an idea about the severity of infection and thus can guide in deciding the treatment protocol. The current study was undertaken to in order to determine the various hematological changes in dogs suffering from parvovirus in Thrissur district in Kerala.

Materials and methods

13 dogs presented to University Veterinary Hospitals of Mannuthy and Kokkalai with a history of vomiting and haemorrhagic or blood-tinged diarrhea were included in the study. Complete history of the dogs such as breed, age, sex, vaccination and deworming history were recorded.

Collection of blood for hematology:

2 ml venous blood from cephalic or saphenous vein was collected in EDTA vials with purple cap prior to starting treatment. This blood was subjected for hematological analysis (Hb, PCV, MCV, MCH, MCHC, TEC, TLC, Lymphocyte %, Granulocyte %, Platelet count) using an automated hematological analyzer.

Collection of fecal samples for PCR:

Rectal swabs from these dogs were collected in 2-3 ml of 0.1 M phosphate buffered saline (pH 7.2) and were transported to the laboratory maintaining the cold chain as early as possible. The samples were centrifuged at 6,000 x g for 15 min at 4°C and the supernatants were stored at –20°C until further use.

Extraction of DNA from fecal supernatants:

CPV DNA was isolated from clarified fecal supernatant using the phenol-chloroform method of DNA extraction.[9] The DNA thus obtained was then stored at at –20°C until further use.

PCR amplification:

PCR was carried out as per the protocol described.[8] using the primer pairs Hfor/Hrev as described earlier.[1] A 630 bp amplicon on 1.5% agarose gel stained with ethidium bromide at a final concentration of 0.5 μg/ml when visualized under UV transilluminator was indicative of the sample being confirmed of having CPV DNA.

Result and discussion

The hematological findings in the 13 CPV positive dogs are as shown in table 1. All the 13 samples were positive by PCR and yielded a 630 bp amplicon on 1.5% agarose gel. Most of the dogs in the study were not vaccinated against parvovirus. Only 2 dogs (15.38%) were not dewormed. All dogs except 1 (age 1 ½ years old) were within the age group of 3 months to 1 year. From table 1, the most common haematological alteration in dogs with parvoviral enteritis were
found to be anemia as evidenced by low values of PCV (30.5±2.7), Hb (11.46±0.87) TEC (5±0.41) and MCV (56.22±1.99). Anemia seen in affected dogs was normocytic normochromic in 7 dogs, microcytic normochromic in 4 dogs, microcytic hypochromic in 1 dog and normocytic hypochromic in 1 dog. Figure 1 shows haematological alterations in the affected dogs.

Table 1: Hematology in dogs with parvoviral enteritis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Mean±S.E</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>g/dl</td>
<td>11.46±0.87</td>
<td>12-18</td>
</tr>
<tr>
<td>PCV</td>
<td>%</td>
<td>30.5±2.7</td>
<td>37-55</td>
</tr>
<tr>
<td>MCV</td>
<td>μm³</td>
<td>56.22±1.99</td>
<td>60-77</td>
</tr>
<tr>
<td>MCH</td>
<td>pg</td>
<td>21.28±1.23</td>
<td>19-25</td>
</tr>
<tr>
<td>MCHC</td>
<td>g/dl</td>
<td>35.71±1.83</td>
<td>32-36</td>
</tr>
<tr>
<td>TEC</td>
<td>X 10³/μl</td>
<td>5±0.41</td>
<td>5.5-8.5</td>
</tr>
<tr>
<td>TLC</td>
<td>X 10³/μl</td>
<td>6.3±1.27</td>
<td>6-17</td>
</tr>
<tr>
<td>L</td>
<td>%</td>
<td>29.13±1.48</td>
<td>12-30</td>
</tr>
<tr>
<td>G</td>
<td>%</td>
<td>59.48±1.59</td>
<td>60-74</td>
</tr>
<tr>
<td>Plt</td>
<td>X 10³/μl</td>
<td>269.07±40.02</td>
<td>160-525</td>
</tr>
</tbody>
</table>

Figure 1: Hematological alterations in dogs with parvoviral enteritis

Anemia in parvovirus encountered in this study is in accordance with the findings of Shah et al. (2013) and Dogra and Sood (2016). The variable forms of anemia except microcytic hypochromic anemia encountered in this study are similar to the findings of Dogra and Sood (2016). Leucopenia and thrombocytopenia in parvoviral enteritis have been reported by Kocaturk et al. (2010), Castro et al. (2013), Shah et al. (2013) and Dogra and Sood (2016). Lymphopenia, lymphocytosis, thrombocytosis, granulocytosis and granulopenia have been recorded by Kalli et al. (2010) in different dogs with parvovirus. The hematological changes in parvoviral enteritis are attributed to be due to destruction of the hematopoietic progenitor cells of various types of leukocytes in the bone marrow and other lymphoid organs such as the spleen, thymus and lymph nodes (Goddard and Leisewitz, 2010).

Conclusion

We can conclude from the above results that anemia was the characteristic clinical findings in all dogs suffering from parvoviriosis in Thrissur district while leucocyte and platelet abnormalities were different in each individual. Therefore it is extremely essential to monitor the hematology in CPV infected dogs in order to aid in treatment of the existing hematological alterations and thus improve the chances of survival.

References


