Rapid Detection based Prevalence of Canine Corona Virus (CCoV) and Canine Parvo Virus (CPV) Infection in Diarrheic Dogs in South Gujarat

Dhruv Desai1*, Irshadullahkhan Kalyani1, Dharmesh Patel1, Pushpa Makwana1, Jignesh Solanki2, Jignesh Vala3

ABSTRACT

The study was done on detection and prevalence of canine coronavirus (CCoV) and canine parvovirus (CPV) from the diarrheic dogs. Dogs presented with the diarrhoea and symptomatic illness, were tested for the CCoV and CPV infection. Diarrhoeic samples were directly processed for rapid diagnostic test using Immuno-chromatography based lateral flow assay test (LFA). It is a fast, rapid and specific for the CCoV and CPV detection. Out of total 109 samples processed by the LFA, 05 (4.58 %) were found positive for CCoV and 37 (33.94%) were positive for CPV. None of the samples showed concomitant infection of both the viruses. Age-wise prevalence of CCoV was found to be 7.93 (5/63) % in ≤3 months age group, and no positive case was found in other age groups. Similarly, the age wise prevalence of CPV was found to be 41.26 (26/63), 25.00 (9/26) and 20.00 (2/10) % in ≤3 months, 3 to 6 months and 6 to 12 months of age group, respectively. The prevalence of CCoV and CPV was found more in young puppies.

Keywords: Canine coronavirus, Canine parvovirus, Lateral flow test kit, Diarrhea, Pups.

INTRODUCTION

Canine coronavirus (CCoV), a single-stranded RNA virus, and Canine parvovirus (CPV), a single-stranded DNA virus, are the major pathogens among the causative agents of canine viral enteritis (CVE) and cause severe diarrhoea in pups (Decaro et al., 2007; Sharma et al., 2018). CCoV cause viral diarrhoea due to its invade and destruction of mature cells on intestinal villi, resulting in disruption of absorptive surface area and malabsorption. Clinical signs generally include anorexia, vomiting and diarrhoea (Yoon et al., 2018). Most of the dogs recover within a week by intense regular treatment along with fluid therapy and mortality seldom occur. CCoV is rarely diagnosed in laboratory because it is self-limiting and less severe than other enteritis. CPV infection is common and generalized in unvaccinated pups and adults below one year of age. Young puppies are more prone to CPV infection in fact it is fatal for them (Desai et al., 2020). The prevalence of CCoV and CPV infection were reported to vary from 6.4 to 18.70 % and 19.73 to 72.92 %, respectively, from different parts of India (Deka et al., 2013). Serological and molecular based epidemiological detection of CCoV and CPV in dogs are suggestive its wide spread in canine population (Deka et al., 2013; Agnihotri et al., 2018). CCoV and CPV may be diagnosed by PCR, ELISA and virus isolation in different cell lines. These all techniques are costly, time consuming, required costly machines, well-established lab and need skill. Diagnosis need to be rapid, accurate and at the point of clinical case presentation. Hence, this study was done to find out the prevalence of diarrhoea causing viral agents namely CCoV and CPV by commercial rapid Immuno-chromatography principle based lateral flow test in south Gujarat.

MATERIALS AND METHOD

Diarrhoeic samples collected from in and around Navsari district, and those received directly at Department of Veterinary Microbiology of the College in Navsari, Gujarat (India) (n=109) were used in this study for rapid detection...
of virus. Sterile swabs and containers were used to collect faecal materials and transferred to the laboratory with ice pack. Samples were noted with the age of dogs to calculate the prevalence of CCoV and CPV in area of south Gujarat for age groups ≤ 3 months, 3-6 months and 6-12 months.

Immuno-chromatography based lateral flow assay (LFA) tests kits procured from Bionote, Inc (Republic of Korea) were used in this study. Individual as well as double test based devices were used for detection as per the manufacturer’s manual. Illustration for interpretation of result used is depicted in Fig. 1 (Yoon et al., 2018). The results were analyzed by chi-square test to find out any significant difference between age groups.

**RESULTS AND DISCUSSION**

In the present study, out of 109 diarrhoeic samples of dogs tested by employing rapid diagnostic LFA test kit, 05 were found to be positive for CCoV and 37 for CPV. None of the samples showed concomitant presence of both viral pathogens. The overall prevalence of CCoV and CPV was found 4.58 % and 33.94 %, respectively (Table 1, Fig. 2). Pandya et al. (2017) reported 37.70 % prevalence of CPV, while Sharma et al. (2018) reported 50 % prevalence of CPV by employing same LFA test. Agnihotri et al. (2017) reported overall prevalence of 8 % and 50 % for CCoV and CPV,

<table>
<thead>
<tr>
<th>Age group</th>
<th>Samples</th>
<th>CCoV (% prevalence)</th>
<th>CPV (% prevalence)</th>
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<tbody>
<tr>
<td>≤ 3 months</td>
<td>63</td>
<td>05 (7.93%)</td>
<td>26 (41.26%)</td>
</tr>
<tr>
<td>&gt;3– ≤ 6 months</td>
<td>36</td>
<td>00</td>
<td>09 (25 %)</td>
</tr>
<tr>
<td>&gt;6– 12 months</td>
<td>10</td>
<td>00</td>
<td>02 (20 %)</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>05 (4.58 %)</td>
<td>37 (33.94 %)</td>
</tr>
</tbody>
</table>

\( \chi^2 \) test p>0.05

![Fig. 1: Illustrations of results on the basis of respective band appearance in LFA test. (C = Control and T = Test)](image1)

![Fig. 2. Representative photographs of CCoV (A) and CPV (B) positive devices.](image2)
respectively, while Sakulwira et al. (2003) reported 12.8 % and 62.8 % prevalence of CCoV and CPV-2 respectively by using molecular based detection technique. The variation of percent positivity in different studies might be due to differences in sample size, assay technique adopted and host-pathogen interaction (Sharma et al., 2018).

The age-wise prevalence of CCoV and CPV is presented in Table 1. The prevalence of CCoV was found to be 7.93 (5/63) % in ≤3 months age group, whereas no positive case was found in other age groups. The prevalence of CPV was found to be 41.26 % in ≤3 months group, 25 % in 3 to 6 months and 20 % in 6 to 12 months age group, respectively. Our study showed higher prevalence of CPV in ≤3 months of age group with decreasing trend of occurrence in the following age groups. Though statistically there was no significant difference between the groups, young puppies of within 3 months of age were found most affected. This might be due to different susceptibility of young puppies, breed variation and its predisposing factors as the pups below six months of age are more prone to CPV viral enteritis (Thomas et al., 2014; Behera et al., 2015; Pandya et al., 2017; Agnihotri et al., 2018). Further, Deka et al. (2013) reported 26.67 % CCoV infection in ≤3 months of age group and 41.86 % CPV infection in 4-6 months of age group in Assam. Agnihotri et al. (2018) reported 59.25 (16/27) % prevalence of CPV in 1-3 months of age and 37.5 (6/16) % in 3-6 months of age. The cases of CCoV infection found only in ≤3 months of age group in the present study might be due to early age susceptibility of pups and not doing vaccination on time.

The lower CCoV prevalence in our study concludes that CCoV does not prevail as CPV in, in south Gujarat, as there is no past reports from this region on prevalence of CCoV, whereas CPV is endemic in south Gujarat as reported by Mehta et al. (2017), Pandya et al. (2017) and Sharma et al. (2018). LFA test is rapid, quick, simple, usable and comparatively inexpensive at the field level, which make it the first choice of clinical support at the field and veterinary dispensaries for diagnosis. Our study found more prevalence of CPV (33.94 %) over CCoV (4.58 %) in diarrhoeic dogs. It suggests CPV is a dominant and major causative agent for CVE in dogs of south Gujarat. Though CCoV may not be a dominant and fatal pathogen of dogs, more studies are required to find out prevalence pattern of CCoV by larger sample size for regular monitoring which may further help in vaccine strategy and policy making.

Acknowledgement

We thank the authorities of Navsari Agricultural University, Navsari for the facilities provided for this work.

References