RESEARCH ARTICLE

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

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Abstract

The study was done on detection and prevalence of canine coronavirus (CCoV) and canine parvovirus (CPV) from the diarrhoeic 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.

Ind J of Vet Sci and Biotech (2020): 10.21887/ijvsbt.16.1.9

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 sings 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.

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How to cite this article: Desai, D., Kalyani, I., Patel, D., Makwana, P., Solanki, J., & Vala, J. (2020). Rapid Detection based Prevalence of Canine Corona Virus (CCoV) and Canine Parvo Virus (CPV) Infection in Diarrheic Dogs in South Gujarat. Ind J Vet Sci and Biotech, 16(1):41-43.

Source of support: Nil

Conflict of interest: None.

Submitted: 15/06/2020 **Accepted:** 21/06/2020 **Published:** 16/08/2020

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,

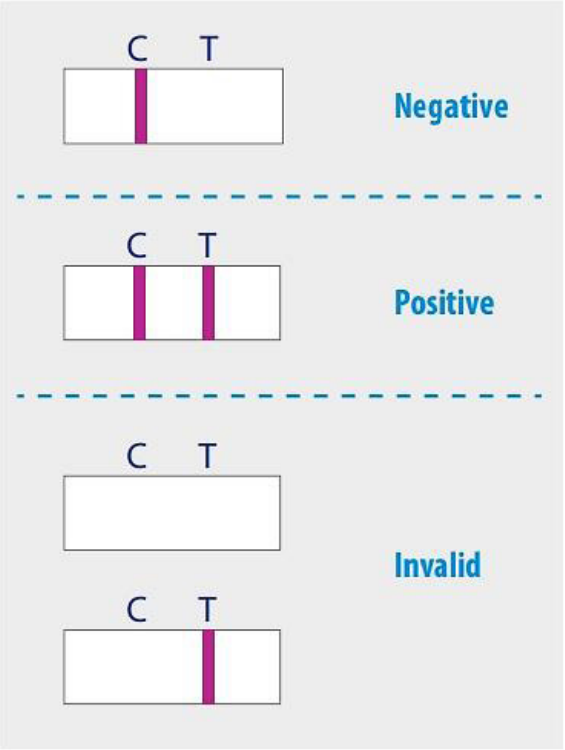

Fig. 1: Illustrations of results on the basis of respective band appearance in LFA test. (C = Control and T= Test)

Fig. 2. Representative photographs of CCoV (A) and CPV (B) positive devices.

Table 1: Age group wise Prevalence of CCoV and CPV and percent positivity

Age group	*Samples*	*CCoV (% prevalence)*	*CPV (% prevalence)*
≤ 3 months	63	05 (7.93%)	26 (41.26 %)
>3- ≤ 6 months	36	00	09 (25 %)
>6- 12 months	10	00	02 (20 %)
Total	109	05 (4.58 %)	37 (33.94 %)
		--	χ^2 test p>0.05

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 is, 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

Agnihotri, D., Singh, Y., Batra, K., Jain, V.K., Kumar, A., Kumar, T., & Maan, S. (2018). Molecular detection based epidemiology of canine parvovirus and canine corona virus infection in diarrheic dogs in Haryana. Journal of Animal Research,8(3):,367-374.

Agnihotri, D., Singh, Y., Maan, S., Jain, V., & Kumar, A. (2017). Molecular detection and clinico-haematological study of viral gastroenteritis in dogs. Haryana Veterinarian, 56(1), 72-76.

Behera, M., Panda, S.K., Sahoo, P.K., Acharya, A.P., Patra, R.C., Das, S., & Pati, S. (2015). Epidemiological study of canine parvovirus infection in and around Bhubaneswar, Odisha, India. Veterinary World, 8(1), 33.

Decaro, N., Desario, C., Elia, G., Campolo, M., Lorusso, A., Mari, V., Martella, V., & Buonavoglia, C. (2007). Occurrence of severe gastroenteritis in pups after canine parvovirus vaccine administration: a clinical and laboratory diagnostic dilemma. *Vaccine,* 25(7), 1161-1166.

Deka, D., Phukan, A., & Sarma, D.K. (2013). Epidemiology of parvovirus and coronavirus infections in dogs in Assam. Indian Veterinary Journal, 90(9), 49-51.

Desai, D., Kalyani, I., Ramani, U., Makwana, P., Patel, D., & Vala, J. (2020). Evaluation of three different methods of viral DNA extraction for molecular detection of canine parvo virus-2 from faecal samples of dogs. Journal of Entomology and Zoology Studies, 8(3), 479-481.

Mehta, S.A., Patel, R.M., Vagh, A.A., Mavadiya, S.V., Patel, M.D., Vala, J.A., & Parmar, S.M. (2017). Prevalence of Canine Parvo Viral Infection in Dogs in and around Navsari District of Gujarat State, India. The Indian Journal of Veterinary Sciences & Biotechnology, 13(2), 67-72.

Pandya, M.S., Sharma, K.K., Kalyani, H.I., & Sakhare, S.P. (2017). Study on host predisposing factors and diagnostic tests for canine parvovirus (CPV-2) infection in dogs. Journal of Animal Research, 7(5), 897-902.

Sakulwira, K., Vanapongtipagorn, P., Theamboonlers, A., Oraveerakul, K., & Poovorawan, Y. (2003). Prevalence of canine coronavirus and parvovirus infections in dogs with gastroenteritis in Thailand. Veterinarni Medicina, 48(6), 163-168.

Sharma, K.K., Kalyani, I.H., Pandya, S.M., & Vala, J.A. (2018). Diagnosis and characterization of canine parvovirus-2 affecting canines of South Gujarat, India. *Acta Veterinaria Brano*, 87(3), 247-254.

Singh, D., Verma, A.K., Kumar, A., Srivastava, M., Singh, S.K., Tripathi, A.K., Srivastava, A., & Ahmed, I. (2013). Detection of canine parvo virus by polymerase chain reaction assay and its prevalence in dogs in and around Mathura, Uttar Pradesh, India. American Journal of Biochemistry and Molecular Biology, 3(2), 264-270.

Thomas, J., Singh, M., Goswami, T.K., Verma, S., & Badasara, S.K. (2014). Polymerase chain reaction based epidemiological investigation of canine parvo viral disease in dogs at Bareilly region. Veterinary World, 7(11), 929-932.

Yoon, S.J., Seo, K.W., & Song, K.H. (2018). Clinical evaluation of a rapid diagnostic test kit for detection of canine coronavirus. Korean Journal of Veterinary Research, 58(1), 27-31.