RESEARCH ARTICLE

Sero-surveillance of Canine Distemper in Dogs

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Abstract

The present study was undertaken on serological survey of Canine distemper (CD) in dogs in various districts of Gujarat state. Sera samples from 86 CD suspected dogs were collected from Anand, Navsari, Ahmedabad and Vadodara districts for detection of antibodies against *CDV*. Out of 86 sera samples screened, 35 were found positive for CD by indirect ELISA, indicating overall seroprevalence to be 40.70%. Location wise, seroprevalence was found to be higher 61.53% (16/26) in Navsari district, followed by 30.43% (14/46) in Anand district. With low sample size, Vadodara and Ahmedabad districts showed 40.00% (2/5) and 33.33% (3/9) seroprevalence, respectively. Sex-wise seroprevalence of CD was found to be higher in females (47.36%) than in males (35.41%), whereas age-wise seroprevalence was found to be higher in 6 to 12 months of age group (43.03%) than >12–24 months of age group (14.28%).

Keywords: Canine distemper, Dogs, Gujarat, Serological Survey.

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Introduction

Canine health management has become the most serious matter of concern in veterinary clinics due to continuous rise of the disease's occurrence in puppies and adult dogs in spite of having vaccine availability. Canine parvoviral infection, *Canine coronavirus* and canine distemper (CD) are the prime causes of acute gastroenteritis (Desai *et al*., 2020[a]). Among these, CD is a incurable disease for the puppies and has higher mortality rate than other dominant canine diseases (Latha *et al*., 2007). *Canine (distemper) morbillivirus (CDV)* is a single-stranded, non-segmented, negative sense RNA virus belonging to the genus *Morbillivirus* of family *Paramyxoviridae* (Loots *et al*., 2017). *CDV* causes primarily systemic and central nervous system disease (Greene and Appel, 2006). The natural host range comprises predominantly carnivores (Beineke *et al*., 2009), of which, pet dogs act as ideal reservoirs of the disease (Vanak *et al*., 2007). *CDV* is the most critical disease, which possesses the risk of possible spillover for wildlife (Vanak *et al*., 2007). Point of care based diagnostic tests, as lateral flow assay and ELISA are most valuable and important tools for the early detection of disease (Desai *et al*., 2020[b]). Similarly, epidemiological survey studies are the prime preventive measures to monitor the status of any etiological agent or its antibody titre in particular population which is at risk. Serological assays like ELISA and serum neutralization test have been reported to determine antibody titres against *CDV*. ELISA is the most convenient technique to determine the seroprevalence and surveying the titre of antibodies at given point of time. Earlier similar studies at the domestic-wildlife interface were conducted on wild animals and domestic stray dogs from different states of India (Ramanathan *et al*., 2007; Vanak *et al*., 2007; Sidhu *et al*., 2019; Nayak *et al*., 2020), but were not reported from the state of Gujarat. Therefore, the present study was undertaken to determine the current status of seroprevalence of CD in dogs of Gujarat state.

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Materials and Methods

Collection of Serum Samples from Dogs

Total 86 sera samples were collected aseptically from 86 *CDV* suspected pet dogs, between September 2019 and February 2020, using sterile syringe and needle. The samples were collected from pet dogs of Anand, Navsari, Ahmedabad and Vadodara districts of Gujarat. The animals included were from both genders, from non-descriptive breeds and from 6 to 24 months old, all with clinical signs suspected for *CDV* infection. The specimen vials were labelled properly with the details of species, age, sex, location, name of the owner, and were

transferred to the laboratory under refrigeration condition and stored in deep fridge (-80°C) until further process.

CD Antibody Detection by ELISA

INgezim Moquillo IgG kit was procured from Immunologia Y Genetica Aplicada, Spain for screening the dog sera samples for *CDV* antibodies. The kit is based on principle of an indirect enzymatic immunoassay (i-ELISA). As vaccination was not done at the time of sample collection, IgG detecting ELISA was used. i-ELISA and its interpretation of result was carried out according to the manufacturer's instruction (Desai *et al.,* 2021). Briefly, sera samples were diluted 1:100 with diluent supplied with kit. Hundred microliter of positive, negative and each diluted serum sample were added to pre-coated ELISA plate and incubated for 10 min at room temperature (RT). Then after, plate was rinsed four times using 300 µL of wash buffer. After that, 100 µL of conjugate was added to each well and incubated for 10 min at RT. Plate was washed for four times and then 100 µL of substrate solution was added and kept for five min at RT. Finally, 100 µL of stop solution was added to each well and absorbance was noted within five min at 450 nm for each sample. Serum positivity based on optical density (O.D) and low, medium, high titre were calculated by following the manufacturer's instruction.

Results and Discussion

In the present study, seroprevalence of *CDV* assessed by i-ELISA in 86 pet dogs included 46 samples from dogs of Anand, 26 samples from Navsari, 09 samples from Ahmedabad and 05 samples from Vadodara districts. Out of the total 86 sera samples screened, 35 (40.70%) sera samples were found positive by i-ELISA (Fig. 1).

The levels of antibody titres in dogs were designated as low titre (+2), medium titre (+4) and high titre (+6) based on the sample to positive percentage. Out of 40.70% (35/86) sera samples positive for CD antibodies, 27.90% (24/86), 10.47% (9/86) and 2.33% (2/86) samples revealed high, medium and low antibody titre, respectively (Table 1). Of these, maximum 87.50% of positive samples (14 out of 16) from Navsari district showed high titre, followed by 64.28% of positive samples (9 out of 14) from Anand district. Most of the positive samples from Ahmedabad and Vadodara districts yielded low or medium antibody titre. The overall seroprevalence recorded in this study was lower than that reported by Saliki and Lehenbauer (2001), Ramanathan *et al*. (2007), and Candela *et al*. (2019), which were 94.83%, 87.5% and 77.77%, respectively. Additionally, when compared to other seroprevalence studies conducted in India, the seroprevalence rate of the present study was lower than 70.00% and 77.77% reported by Latha *et al*. (2007) and Desai *et al*. (2021), respectively. However, the seroprevalence rate was higher than 17.36% to 33.33% reported by McRee *et al*. (2014) and Vitásková *et al*. (2019).

Out of four districts included in the study, seroprevalence of *CDV* was found to be 30.43%, 61.53%, 33.33% and 40.00% in Anand, Navsari, Ahmedabad and Vadodara districts, respectively. Thus, the location wise seroprevalence was highest in Navsari district followed by Vadodara, Ahmedabad and Anand district. Although, it is difficult to interpret the higher/lower seroprevalence rates in Ahmedabad and Vadodara districts due to comparatively smaller sample size, the seroprevalence rates recorded in two other districts of Anand and Navsari can be a good indicator of the CD seroprevalence in these areas. The seroprevalence work of CD assessed by i-ELISA using sera samples of 48 male dogs and 38 female dogs revealed that 17 out of 48 (35.41%) male dogs, and 18 out of 38 (47.36%) female dogs tested positive

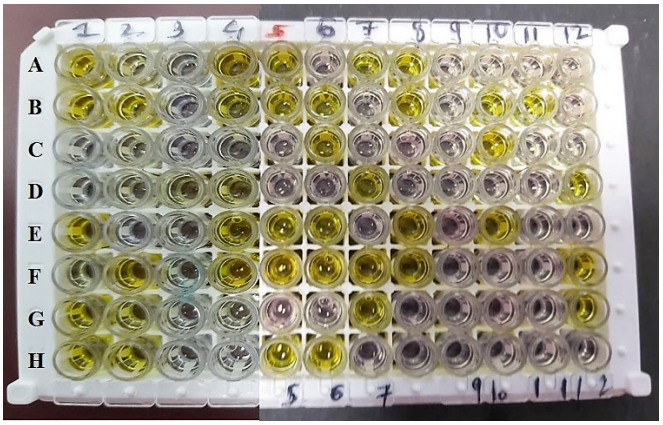

Fig.1: Microtiter plate showing colour development for dog sera samples.
A1, B1, A5 and B5: Positive control; C1, D1, C5 and D5: Negative control; Rest are sera samples.

Table 1: Details of sera samples positive for CD antibodies by i-ELISA

	No. of sera samples					
		Positive				
		Titre				
Location	*Negative*	*Low*	*Medium*	*High*	*Total positive*	*Grand total*
Anand	32	-	5	9	14	46
Navsari	10	-	2	14	16	26
Ahmedabad	6	1	1	1	3	9
Vadodara	3	1	1	-	2	5
Total (%)	51 (59.30)	2 (2.33)	9 (10.47)	24 (27.90)	35 (40.70)	86

Table 2: Details of seroprevalence of CD detected by i-ELISA

	Attributes	*No. of dogs tested*	*No. of positive dogs*	*Seroprevalence %*
Location wise seroprevalence of CD				
1	Anand	46	14	30.43
2	Navsari	26	16	61.53
3	Ahmedabad	9	3	33.33
4	Vadodara	5	2	40.00
Sex wise seroprevalence of CD				
1	Male	48	17	35.41
2	Female	38	18	47.36
Age wise seroprevalence of CD				
1	> 6-12 months	79	34	43.03
2	12-24 months	7	1	14.28
	Total	86	35	40.70

for presence of CD antibodies (Table 2). Kelly *et al*. (2005) reported higher prevalence of CD infection in male dogs (58.00%) than the females (4.04%).

The dogs of >6-12 months of age group recorded higher seroprevalence of CD (43.03%, 34/79), than those of age group >12-24 months (14.28%, 1/7) (Table 2). Because of unequal sample size for these two age groups, it was difficult to interpret the results in terms of age dependent seroprevalence of CD. Nevertheless, the prevalence of CD was higher in younger age group as the maximum number of samples were available from this age group. Desai *et al*. (2021) reported higher percent positivity in 6-12 months of age group than the 0-6 months. Contrarily, Kelly *et al*. (2005) reported higher prevalence of CD infection in dogs under the age group of 1-2 years and McRee *et al*. (2014) reported higher prevalence in younger dogs (84.00%).

Conclusions

The canine distemper is a fatal disease of dogs and wild cats. The present study conducted sero-surveillance study in Gujarat state of India. The overall seroprevalence was found to be 40.70 %. Sero-positivity was higher in female than male dogs. The current survey urges for the larger sample size study in the canine population of Gujarat state.

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ANNOUNCEMENT: SVSBT-NS-2022

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