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Short Communication

Prevalence of Canine Distemper in and Around Parbhani, Maharashtra, India

Krushnakant Subhash Wagh[1], Meera Pundlikrao Sakhare[1], Abdul Mujeeb Syed[2], Prashant Ramchandr[1] Suryawanshi[3], Md. Ferozoddin Siddiqui[3], Prashant Madhavrao Mane[2] and Tawheed Ahmad Shafi[1]*

[1]Department of Veterinary Medicine,
[2]Veterinary Clinical Complex,
[3]Department of Veterinary Microbiology,
College of Veterinary and Animal Science, Parbhani, Maharashtra Animal and Fishery Sciences University, Nagpur, Maharashtra, INDIA

*Corresponding Author: shafitawheed@mafsu.in; tawheed78@gmail.com

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Abstract

The research involved 451 dogs, out of which 60 dogs exhibiting more than three symptoms identical to Canine distemper (CD) were subjected to Rapid CDV Ag test using oculo-nasal swabs that confirmed 28 cases. Month-wise distribution revealed winter months accounted for comparatively more CD cases than summer and rainy seasons. Age-wise 0 to 6 months old revealed the highest prevalence (18.33%) followed by 7-12 months (13.33%) and 13-24 months (8.33%) while as prevalence was lowest (3.33%) for 24-36 months and more than 36 months' age. The study revealed that males have a slightly higher prevalence (26.67%) than females (20.00%) although this difference is statically non-significant ($\chi 2$ =0.306, df = 1, P=0.580). Breed-wise prevalence was highest for non-descript dogs (26.67%) and the lowest for the breeds of Beagle and Doberman (1.67%). Although the prevalence between vaccinated and unvaccinated populations was statically non-significant ($\chi 2$ = 1.159, df = 1, P=0.162) it was slightly more in the unvaccinated dog population (31.67%) than in vaccinated dogs (15.00%).

Keywords: Canine Distemper, Rapid CDV Ag Test, Prevalence.

Introduction

The most widespread carnivore in the world is not often thought of as a member of the fauna, instead, it is the domestic dog (*Canis familaris*), a commensal of humans. The dog has been domesticated in South Eastern Asia for 12000–15000 years and is regarded as the ideal companion animal for humans (Messent, 1979; Boorer, 1981). Wherever humans have inhabited, dogs have been introduced, and when they are not properly handled, these animals flourish in human environments (Daniels and Bekoff, 1989) bringing in few with few disadvantages as dogs' act as ideal reservoirs of various diseases (Vanak *et al*., 2007). Among various infectious diseases of dogs, Canine distemper (CD) poses a high threat due to its serious form of sequelae. Canine distemper virus (CDV) is a pantropic virus and amongst various clinical manifestations the neurological manifestation is more concerning which lasts for a longer duration and many dogs also succumb to it. The prevalence study helps in the planning of proper prophylactic and therapeutic approaches against CD. The present study was therefore planned to record the prevalence of CD in dogs referred to Veterinary Clinical Complex, COVAS, Parbhani from various regions of Parbhani district, Maharashtra, India.

Materials and Methods

Sample collection and confirmation using PetX Rapid CDV Ag test

The research work was carried out in dogs presented to Veterinary Clinical Complex including the cases referred by private clinics as well as government polyclinics from in and around Parbhani. The dogs suspected of CDV infection exhibited signs such as oculo-nasal discharge, respiratory distress, nervous signs of various ranges, cutaneous lesions, and gastro-intestinal signs. In total 451 dogs were presented at the Veterinary Clinical Complex between 12th April 2023 to 10th January 2024, out of which 60 dogs exhibiting more than three symptoms identical to CD were subjected to PetX Rapid CDV Ag test kit (Fig 1) using oculo-nasal swabs collected and processed as detailed below;

1) The swab was sufficiently wetted with oculo-nasal secretions from suspected dogs. 2) The swab was inserted into the assay buffer tube provided with the kit with proper agitation to get efficient sample extraction.
2) The test device was removed from the foil pouch and placed horizontally.
3) Extracted sample was sucked gently from the assay buffer tube and 3 drops were placed into the sample hole "S" of the test device.
4) Interpretation of results
   a) Positive (+): The appearance of both the "C" line and the "T" line, no matter the T line is clear or vague (Fig. 2).
   b) Negative (-): Only a clear "C" line appears. No "T" line in appearance (Fig. 3).
   c) Invalid: No coloured line "C" appears. No matter if the "T" line appears.

Fig 1: PetX CDV rapid antigen (Ag) test kit by J&G Biotech Ltd.

Recording of Prevalence

The prevalence of CD was noted on the basis of dogs showing positive test on PetX Rapid CDV Ag test kit out of the total dogs screened for the CD (60). The prevalence was therefore noted with respect to Season, Age, Sex, Breed and Vaccination status of the CD suspected cases.

Statistical Analysis

The data obtained in the study was analyzed in Microsoft Excel and the Chi-square test (χ^2) to examine the association was applied wherever applicable using a statistical package for social science (SPSS version 16.0 for Windows). The significance level was set at $P < 0.05$.

Results and Discussion

Out of 60 dogs 28 yielded positive result (Fig 2), thus indicating 46.67% of total prevalence, while as rest of the dogs screened negative on CDV Ag test kit (Fig 3). Several researchers have also reported the use of on-site CDV Ag test kits for the quick diagnostic test of canine distemper virus antigen detection (Aldavood *et al*., 2009; Rakha *et al*., 2015; Temilade *et al*., 2015; Yadav *et al.*, 2022; Karki *et al*., 2023). Rapid CDV Ag test is relatively easy to perform and can be used as a regular diagnostic procedure for identifying canine distemper virus infection in dogs.

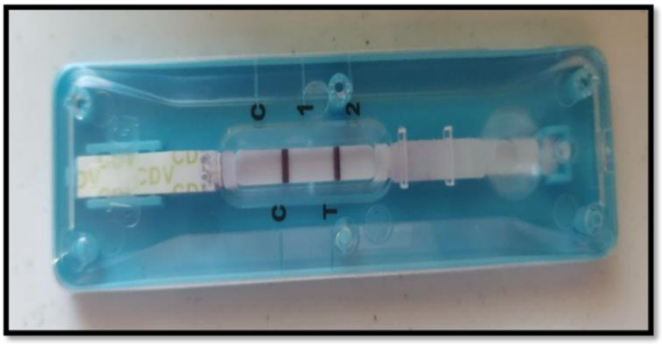

Fig 2: PetX CDV rapid Ag kit showing positive result

Fig 3: PetX CDV rapid Ag kit showing negative result

Seasonal Prevalence of CDV Infection

Season-wise distribution of clinical cases of CD in dogs revealed winter months (October- January) accounted for comparatively more CD cases than summer (April-May) and rainy season (June-September) (Table 1). Singh *et al*. (2024) reported highest case prevalence of CD infection (14.40%) in the winter season, whereas lowest prevalence (3.03%) was noted in the monsoon season. Kadaba (2010) carried out an epidemiological analysis of the dogs hospitalized at the BSPCA Hospital in Mumbai and saw lower incidence in the monsoon and higher incidence in the winter a finding that was corroborated to reduction in temperature and humidity. Mousafarkhani *et al*. (2023) found highest prevalence of CDV in cold season (71.43%). Swango (1989) suggested that the colder months may have aided virus survival and caused immunological suppression in pediatric animals. Headley and Graca (2000) stated that CDV being an enveloped virus has a longer half-life at low temperatures and is susceptible to high temperatures. Consequently, it is anticipated that autumn and/or winter season will have a high proportion of suspected and confirmed referral cases.

Age-wise prevalence of CDV infection

The study revealed that the age group 0 to 6 months have the highest prevalence (18.33%) followed by 7-12 months (13.33%) and 13-24 months (8.33%) while as prevalence was lowest (3.33%) for 24-36 months and more than 36 months' age (Table 2). Devi *et al*. (2022) reported that among the 131 CDV infected dogs, 38 (or 29%) were less than 6-month-old, 23 (17.55) were 6 months-1-year-old, 18 (13.74) were 1-1.5 years old, 28 (or 21.37%) were 1.5-3 years old and 24 (18.32%) were older than three years. Desai *et al*. (2021) while screening dogs for CD observed 71.42% positive cases in 0–6 months and 77.77% in 6–12 months' age. Ferdous *et al*. (2023) observed similar trend where, out of 12 CDV positive dogs 7 were between age group 0 to 6 months while as 5 dogs in age group of 7 months to 36 months. Singh *et al*., (2024) found a strong correlation between age and CDV prevalence and concluded that puppies were more likely than adults to contract CDV infection. Bhagat, (2017) noted a 61.11% prevalence of CDV in the age group of 0 to 6 months. A similar finding was noted by Dongre *et al*. (2013) who reported CDV infection in 55.56% of dogs of age group 0 to 6 months. According to Tiploid *et al*. (1992), CD often affects young, unvaccinated dogs during their first year of life, however many cases were also observed in adults. Buragohain *et al*. (2018) reported the highest incidence of CDV (55.17%) in puppies 0-6 months' age followed by dogs aged 6 and 12 months (22.41%), and dogs older than 24 months had the lowest incidence (17.24%). Higher prevalence has been also reported in younger puppies under 1.5 years by Joswik and Frymus (2002), Coates and Bergman (2005), Nelson and Couto (2009), Budaszewski (2014), and Luo *et al*. (2017). On the other hand, Latha *et al*. (2007) in an epidemiological investigation reported greater CD incidence in 1–5-year age group dogs. According to a risk factor study, conducted by Mahajan *et al*. (2018), age groups under one-year-old were 1.292 times more susceptible to canine distemper than 1-3 years old age group, and 3-6 years old were 1.384 times more susceptible than 6-9 years old age group that were 4.051 times more vulnerable than age groups >9 years old. Increased risk of CD in the 0–1-year age group may be attributed to the routine practice of administering the first vaccine to young pups at an earlier age, at which the presence of maternally produced CD antibodies could lead to vaccination failure in young pups. On the other hand, Greene (2006) stated that the underdevelopment of the immune system could be also one of the reasons of increased susceptibility to CD infection during young age. Puppies who acquire adequate maternally derived antibodies (MDA) are typically protected against CDV until the age of 3 months and puppies between 3-6 months' age are the most commonly affected by the disease, and also those puppies with insufficient MDA are vulnerable to CDV from birth.

Sex-wise Prevalence of CDV Infection

The study revealed males have a slightly higher prevalence (26.67%) than females (20.00%) although this difference was statically non-significant ($\chi 2$ =0.306, df = 1, P=0.580) (Table 2). Bhagat, (2017) observed CDV prevalence slightly higher in males (48.27%) than in females (44.44%). Islam *et al*. (2019) conducted a study on CD during 2018-2019 and reported a prevalence in males (53.33) as compared to females (46.66), a similar finding was noted by Devi *et al*. (2022) who reported a prevalence of 62.60% and 37.40% in males and female respectively. Ferdous *et al*. (2023) noted that, out of 12 CDV-infected dogs, 8 were male and 4 were female. The higher prevalence of CDV in male dogs may be due to slightly more representation in the studies. As per Buragohain *et al*. (2018), there may be more male animals in and around the city, which could account for the increased incidence of male dogs. In contrast, Temilade *et al*. (2015) and Singh *et al*. (2024) reported that female dogs were more likely than males to have CDV infection. Mohammad *et al*. (2022) speculated that, for reproductive and hormonal reasons, female dogs might be under more stressed state than males and therefore more vulnerable to CD. Nonetheless, several earlier researches concluded that gender did not affect the occurrence of CD because both genders experience equal viral exposure (Headley and Graca, 2000; Latha *et al*., 2007; Okbu *et al.*, 2017; Shurbe, 2019; Kim *et al*., 2004).

Breed-wise Prevalence of CDV Infection

The breed-wise prevalence was highest for non-descript dogs (26.67%) and the lowest for the breeds of Beagle and Doberman (1.67%) (Table 1). Ferdous *et al*. (2023) found equal hospital prevalence of CDV infection among the breed of German Shephard and local non-descript dogs (4 each out of 12 CDV positive dogs), and 2 each belonged to Doberman breed and Labrador breed. Headley and Graca. (2000) stated that it is unclear why non-descript dogs are more vulnerable to CDV infection, one of the reasons could be their behaviour of roaming more freely that increases their risk of contact with dogs carrying the CDV virus and other reason may be receiving less attention from the owners than purebred dogs. Devi *et al*. (2022) while conducting research on topic titled clinico-epidemiological pattern of canine distemper in Chennai during the period April 2021 to September 2022 found

majority (82/131) of CD infected dogs as non-descript whereas 49 dogs were cross-breed. In order to determine the proportional incidence of dog diseases, Uddin *et al*. (2021) carried out a retrospective cross-sectional study and reported highest incidence (0.9%) of canine distemper in local dog breeds followed by 0.6% each in Labrador Retrievers and German Shephards, 0.4% in Golden Retrievers and lowest proportional incidence (0.1%) in case of Pomeranian breed. Patronek *et al*. (1995) concluded that nondescript dogs (mongrels) are more susceptible to the disease than purebred dogs as they freely interact with carrier dogs on a regular basis, whereas, Luo *et al*. (2017) reported increased occurrence in pure breed dogs a finding that may be due to distribution of a specific breed in their study leading to breed-wise variations in CD prevalence in various studies.

Vaccination Status-Wise Prevalence of CDV Infection

Although the prevalence was slightly more in unvaccinated dog population (31.67%) than vaccinated dogs (15.00%), the difference was statically non-significant ($\chi 2 = 1.159$, df = 1, P=0.162) (Table 2). Similar finding was documented by Bhagat, (2017), who reported slightly higher prevalence in vaccinated (50%) dogs than non-vaccinated (37.05%). Mousafarkhani *et al*. (2023) conducted a study to record prevalence of CD in dogs between September 23, 2018 and September 22, 2019 and reported 45 (91.84%) out of the 49 confirmed dogs had not received the vaccine or had incomplete or unclear vaccination records, whereas 4 (8.16%) manifested the symptoms of the disease despite having received vaccine. Behera *et al*. (2014) reported 10 dogs with clinical signs of CD which have not received the vaccination against it. According to Latha *et al*. (2007), a higher incidence of the disease was linked to a lack of frequent immunization. When exposed to stress, immunosuppression, or contact with infection, dogs who did not receive periodic booster vaccinations may lose their immunity and contract the disease. According to Sharma (2017), Kapil and Yeary (2011), who also reported CD infection in vaccinated dogs, suggested that insufficient immunity, inadequate vaccine storage, stress, and the use of polyvalent vaccines could be the cause of vaccination failure making dogs more susceptible to the infection.

Table 1: Month-wise, age-wise and breed-wise prevalence of CD in dogs.

Particulars		otal no. of sample examined (N=60)	Positive samples	Prevalence (%)
Month	Summer (Apr-May)	3	1	1.67
	Monsoon (June-Sept)	26	10	16.67
	Winter (Oct-Nov)	31	17	28.33
Age-wise	0-6 Months	13	11	18.33
	7-12 Months	15	8	13.33
	13-24 Months	12	5	8.33
	24-36 Months	10	2	3.33
	>36 Months	10	2	3.33
Breed-wise	Non- descript	23	16	26.67
	German Shephard	13	2	3.33
	Golden Retriever	11	2	3.33
	Labrador	6	3	5.00
	Pomeranian	4	3	5.00
	Beagle	1	1	1.67
	Doberman	2	1	1.67

Table 2. Sex-wise and vaccination status-wise prevalence of CD in dogs

Particulars		Total no. of sample examined	Positive samples	Prevalence (%)	χ^2
Sex-wise	Male	32	16	26.67	χ^2 =0.306, df = 1, P=0.580
	Female	28	12	20.00	
Vaccination status-wise	Vaccinated	25	9	15.00	χ^2 = 1.159, df = 1, P=0.162
	Unvaccinated	35	19	31.67	

Conclusion

The study highlights the necessity of proper seasonal management of dogs and blanket vaccination of all dogs which should include both puppies and adults. Also, due importance must be given to vaccinating non-descript stray dog populations that can otherwise harbour the infection that can pass on to domesticated pet dogs upon interacting with each other.

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Contribution by Authors

Equal contribution. All authors declared that 'written informed' consent was obtained from the approved parties for the publication of this article and accompanying images.

Conflict of Interests

There is no conflict of interest.

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