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Original Article

Retrospective Study on Canine Distemper Cases in Cebu, Philippines (2019-2024)

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ABSTRACT

Background: Canine distemper (CD) remains a significant global threat to dog populations, yet comprehensive epidemiological data in the Philippines are limited, restricting accurate evaluation of vaccination programs and targeted control strategies.
Objectives: This study aimed to address these gaps by analyzing clinical data from selected veterinary clinics in Cebu, Philippines, to better understand CD patterns and associated risk factors.
Methods: A retrospective analysis was conducted on 417 clinical cases recorded from 2019 to 2024 across three veterinary clinics in Cebu. After data cleaning, 360 cases were included. Dogs tested for canine distemper virus (CDV) using commercial test kits met the inclusion criteria. Data on patient profiles, clinical signs, and treatments were collected and analyzed.
Results: CDV-positive cases accounted for 49.4% of cases, while 50.6% were negative, with an increase in infections observed in 2024 (53.6%). Male and female dogs were equally affected. Most CDV-positive dogs were mixed-breed (82.6%), unvaccinated (83.7%), small-sized (68.8%), and within the young adult to mature adult age range (26.8–37.5%). Common clinical signs included ocular and nasal discharges (100%), inappetence (43.6%), fever (31.4%), and lethargy (8.3%). Co-infections such as *Ancylostoma* spp. (12.4%), canine ehrlichiosis (6.7%), canine parvovirus (5.1%), *Trichuris* spp. (5.1%), canine anaplasmosis (4.5%), and canine babesiosis (3.4%) were also noted. Treatment frequently involved antibiotics, particularly doxycycline (30.6%), along with supportive therapies including vitamins and supplements. Statistical analysis showed significant associations between CD positivity and age ($\chi^2 = 20.631$, df = 4, $P < 0.001$) and vaccination status ($\chi^2 = 7.969$, df = 2, $P = 0.019$).
Conclusion: These findings highlight the importance of vaccination and client education. Strengthened vaccination programs, improved diagnostics, and community-based interventions are essential to reduce CDV prevalence and improve outcomes in Cebu.

Keywords: *canine distemper, Philippines, vaccination, retrospective study*

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INTRODUCTION

Canine distemper virus (CDV) is a frequently fatal, highly contagious morbillivirus (family Paramyxoviridae) that is closely related to the human measles virus

(Martella et al., 2008; Whitehouse, 2022). It remains a significant global health issue affecting domestic dogs and multiple wildlife species, with documented multi-host transmission and impacts on wild carnivores and other susceptible populations (Beineke et al., 2015; Deem et al., 2000; Duque-Valencia et al., 2019; Rivera-Martínez et al., 2024). Despite substantial veterinary advancements—including the availability of effective vaccines—canine distemper continues to threaten communities with inadequate veterinary access and persistently low vaccination coverage (Dodds, 2021; Smith et al., 2022). Clinically, canine distemper (CD) presents with diverse and severe symptoms involving multiple organ systems, commonly including fever, respiratory signs (e.g., nasal/ocular discharge, coughing, dyspnea), gastrointestinal signs (e.g., vomiting and diarrhea), and potentially severe neurologic disease (e.g., seizures, paresis/paralysis, and behavioral changes) (Martella et al., 2008; Whitehouse, 2022). These diverse manifestations can complicate timely clinical recognition and laboratory confirmation, underscoring the need to strengthen prevention, surveillance, and control strategies—especially in under-resourced settings (Meazzi et al., 2022; Shi et al., 2024).

Several factors can significantly influence the prevalence and spread of CD. Vaccination status is a critical determinant, as unvaccinated dogs have been shown to have higher infection rates (Mohan et al., 2024; Patronek et al., 1995; Mousafarkhani et al., 2023). Age affects susceptibility, with young dogs under 12 months being particularly vulnerable. However, notable prevalence persists among dogs aged 1 to 5 years and in older dogs (>24 months) (Costa et al., 2019; Mohan et al., 2024; Mousafarkhani et al., 2023). Breed-related factors further influence prevalence, with mixed-breed and non-descript dogs facing higher risks than purebred dogs (Mohan et al., 2024; Patronek et al., 1995). Additionally, geographic and environmental elements play essential roles, as higher prevalence rates typically occur in densely populated canine communities and colder climates, with stray and free-roaming dogs further exacerbating this risk (Costa et al., 2019; Liang et al., 2024; Mohammad et al., 2022; Mousafarkhani et al., 2023).

Although canine distemper (CD) has been extensively studied in other countries (Deem et al., 2000; Martella et al., 2008; Rivera-Martínez et al., 2024; Whitehouse, 2022), published reports from the Philippines remain comparatively limited. In the Philippines, CD has been molecularly detected and characterized (Nobleza et al., 2017), and the clinical features of serologically confirmed cases have also been documented (Santos et al., 2024); however, these reports are from the northern part of the country. Other areas may likewise be vulnerable, including Cebu, a rapidly developing urban center in the Philippines. Barriers to accessing affordable veterinary services—including financial constraints—may influence pet owners' uptake of preventive care and vaccination (Smith et al., 2022). In addition, Cebu's stray dog population dynamics, gaps in responsible ownership practices (e.g., pet registration), and inconsistent animal control measures may facilitate ongoing virus transmission and reduce adequate vaccination coverage (Abdulkarim et al., 2021; Chaudhari et al., 2022).

Socioeconomic disparities compound these issues, as economically disadvantaged pet owners face difficulties accessing veterinary care and vaccinations, placing their pets at a higher risk of infection than more affluent communities (Mahajan et al., 2018). On the other hand, unvaccinated stray dogs act as vectors for viral transmission, complicating eradication efforts. Public awareness campaigns remain limited in scope and fail to achieve adequate vaccination coverage or counter misinformation effectively. Successful disease control requires coordinated efforts among government agencies, non-governmental organizations, veterinary professionals, and local communities to promote unified, comprehensive approaches that improve health outcomes (Fyumagwa et al., 2024).

To the best of the authors' knowledge, there is a notable gap in the epidemiology of CD in the Philippines, including Cebu, Philippines. Veterinary clinics and hospitals maintain isolated records without centralized coordination, preventing a comprehensive understanding of disease incidence, prevalence, and distribution. This fragmented approach hinders the accurate evaluation of vaccination programs and targeted interventions, limiting their overall effectiveness (Liang et al., 2024). This study aimed to address these critical gaps by systematically analyzing clinical data from local veterinary clinics. It provides essential insights for effective CD prevention and treatment interventions suitable for Cebu and other areas of the country.

MATERIALS AND METHODS

Research Design and Environment

A retrospective study was employed to investigate cases of CD from three veterinary clinics and hospitals in Cebu, Philippines, from 2019 to 2024. Data were collected using a fixed form per case at participating veterinary clinics and hospitals. At the same time, further data processing and analysis were conducted at the College of Veterinary Medicine on the Barili Campus of Cebu Technological University.

Selection of Veterinary Clinics and Hospitals and Cases

A total of 20 veterinary clinics and hospitals in Cebu, Philippines, were invited, but only three participated in the study (GPY Veterinare Animale and Aycardo Veterinary Center in Cebu City, and St. Blaise Pet Essentials and Veterinary Services in Talisay City). Cases from the clinical records were manually examined. A total of 417 clinical cases were initially included, but were subsequently reduced to 360 after data cleaning. Only those patients that were tested for CD using commercial test kits were considered, and information about owners was excluded. Molecular confirmation (PCR) was not performed, and hence, ruling out those rapid test kit-negative cases to be truly negative is a limitation.

DATA GATHERING, PROCESSING, AND ANALYSIS

A letter invitation to participate in the study was sent to prospective veterinary clinics and hospitals. Upon confirmation, data collection visits were scheduled. Information from the clinical records (patient profile, CDV test results, clinical signs, and medications administered) was obtained and recorded in a designated form. Data from the designated forms were entered into Microsoft Excel (Office 2019; Microsoft Corporation). The validity of this information was confirmed. The encoded data were imported into IBM SPSS Statistics (Version 24) software for further analysis. Descriptive statistics were employed. The Chi-square test was used to assess the association between serological positivity and variables, including profile, clinical signs, and medication. A p-value of equal to or less than 0.05 was considered statistically significant. Binary logistic regression was also performed to determine relationships between serological positivity and different variables.

RESULTS

Profile of Dogs

Nearly half (49.4%) of the tested dogs were positive for CDV infection. Most dogs were males (53.9%), juveniles (6-12 months; 31.7%), Mixed-breed dogs (79.2%), and in the small body weight category (up to 10kg; 66.7% of the sample). A large majority of the dogs tested were unvaccinated (81.7%), and only a small fraction were fully vaccinated (9.2%). Moreover, some CDV-positive dogs were found to be co-infected with *Ancylostoma* spp. (12.4%), canine ehrlichiosis (6.7%), canine parvovirus (5.1%), *Trichuris* spp. (5.1%), canine anaplasmosis (4.5%), canine babesiosis (3.4%), *Otodectes* sp. (0.6%), coccidiosis (0.6%), giardiasis (0.6%), *Toxocara* sp. (0.6%), and canine adenovirus (0.6%) (table not shown).

Table 1. Profile of dogs tested for canine distemper in Cebu, Philippines (2019-2024) (n=360)

Parameters	Freq	%
Year		
2019	37	10.3
2020	23	6.4
2021	29	8.1
2022	33	9.2
2023	45	12.5
2024	193	53.6
Total	360	100.0
Canine Distemper Test		
Negative	182	50.6
Positive	178	49.4
Total	360	100.0
Veterinary Clinic		
GPY Veterinare Animale	140	38.9
Aycardo Veterinary Center	101	28.1
St. Blaise Pet Essentials and Veterinary Services	119	33.1
Total	360	100.0
Sex		
Male	194	53.9
Female	166	46.1
Total	360	100.0
Age		
Puppy (until 5 months)	66	18.3
Juvenile (6-12 months)	114	31.7
Young adult (1-2 years)	56	15.6
Mature Adult (2-6 years)	99	27.5
Senior (7-11 years)	23	6.4
Geriatric (12 years and above)	2	0.6
Total	360	100.0
Breed Category		
Mixed	285	79.2
Pure	75	20.8
Total	360	100.0
Body Weight Category		
Small (up to 10 kg)	240	66.7
Medium (10-25 kg)	87	24.2
Large (26-40 kg)	4	1.1
Giant (Above 40 kg)	1	0.3
Not indicated	28	7.8
Total	360	100.0

Table 1. continued

Parameters	Freq	%
Vaccination Status		
Unvaccinated	294	81.7
Incomplete	29	8.1
Complete	33	9.2
Not indicated	4	1.1
Total	360	100.0
Other tests performed with positive results*		
Canine parvovirus	30	8.3
Canine adenovirus	1	0.3
Canine anaplasmosis	30	8.3
Canine babesiosis	32	8.9
Canine ehrlichiosis	51	14.2
Canine heartworm	1	0.3
Canine leptospirosis	1	0.3
Hookworm	22	6.1
Whipworm	9	2.5
Toxocara spp.	2	0.6
Giardia spp.	1	0.3
Coccidiosis	1	0.3
Otodectic mange	2	0.6

*Multiple responses

Clinical Signs Presented by Dogs

All CDV-positive dogs exhibited ocular and nasal discharges (100%). Other common clinical signs included inappetence (43.6%, n=157), fever (31.4%, n=113), and lethargy (8.3%, n=30) (table not shown). Less frequent but severe signs included seizures, hemoptysis, and neurological symptoms (0.3% each) (Table 2). A wide array of additional clinical signs demonstrated the multisystemic nature of CDV infections. These included respiratory, neurological, and gastrointestinal manifestations (Table 2).

Common Medications Administered

A variety of medications were administered to dogs diagnosed with CDV. Common antibiotics included doxycycline (30.6%), azithromycin (15.8%), and co-amoxiclav (10.6%) (Table 3). Supportive therapies included oral rehydration salts (4.2%, n=15), vitamin B-complex supplements (13.1%), herbal immune boosters (26.1%), and herbal respiratory supplements (20.0%). Anticonvulsants such as gabapentin (3.9%) and levetiracetam (3.3%) were provided to manage neurological signs in affected dogs. Additionally, ophthalmic medications, predominantly sodium hyaluronate (8.6%), were used to address ocular complications associated with CDV infection. Immunostimulants, such as immunoglobulin injections (5.8%, n=21), were also administered.

Factors Associated with CDV Seropositivity

The chi-square test revealed that CD positivity was significantly associated with age category ($\chi2=20.631$, df=4, $p<0.001$) and vaccination status ($\chi2=7.969$, df=2, $p=0.019$). However, binary logistic regression showed that only the age category fitted in the model with a significant association with CDV test outcome (Omnibus $\chi^2(2)=18.636$, $p<0.001$). Using dogs aged 1–6 months as the reference group, dogs aged >18 months had significantly higher odds of testing CDV-positive (B=1.053, OR=2.865, $p<0.001$).

Table 2. Presenting clinical signs of dogs tested for canine distemper in Cebu, Philippines (2019-2024) (n=360)

Clinical signs*	Freq	%
Ocular Discharges	360	100.0
Nasal Discharges	360	100.0
Inappetence	157	43.6
Fever	113	31.4
Lethargy	30	8.3
Pale mucous membranes	1	0.3
Emaciation	1	0.3
Sudden collapse	1	0.3
Dehydration	1	0.3
Sneezing	1	0.3
Coughing	1	0.3
Epistaxis	1	0.3
Labored breathing	1	0.3
Tachypnea	1	0.3
Seizures	1	0.3
Involuntary movements	1	0.3
Shivering	1	0.3
Vomiting	1	0.3
Diarrhea	1	0.3
Rectal prolapse	1	0.3
Hemoptysis	1	0.3
Red sclera	1	0.3
Ear discharge	1	0.3
Tachycardia	1	0.3
Bradycardia	1	0.3
Arrhythmia	1	0.3
Tick infestation	1	0.3
Skin lesions	1	0.3
Enlarged lymph nodes	1	0.3
Hematuria	1	0.3
Hypersalivation	1	0.3

*Multiple responses

Dogs aged 7–18 months did not have significantly different odds of CDV positivity compared with the 1–6 months group (B=0.262, OR=1.300, p=.396). Overall classification accuracy of the model was 61.1%, with modest explained variance (Cox & Snell R^2 = 0.050; Nagelkerke R^2 = 0.067).

Table 3. Common medications given to canine distemper cases in Cebu, Philippines (n=178)

Medications Given or Prescribed	Freq	%
Antibiotics		
Doxycycline	110	30.6
Azithromycin	57	15.8
Co-amoxiclav	38	10.6
Enrofloxacin	37	10.3
Metronidazole	9	2.5
Tobramycin	5	1.4
Clindamycin	5	1.4
Marbofloxacin	4	1.1
Cefuroxime	2	0.6
Co-trimoxazole	2	0.6
Anti-diarrheal		
Sulfadiazine-based syrup	2	0.6
NSAID/Steroids		
Prednisone	7	1.9
Tolfenamic acid	4	1.1
Gastrointestinal Medications		
Metoclopramide	2	0.6
Ranitidine	2	0.6
Maropitan	1	0.3
Aluminum hydroxide/Magnesium hydroxide	1	0.3
Immunostimulants		
Immunoglobulin inj.	21	5.8
Newcastle's disease vaccine for immunotherapy	1	0.3
Inosiplex	2	0.6
Bronchodilators		
Salbutamol	1	0.3
Ambroxol	2	0.6
Antiparasitics		
Febantel-Pyrantel-Praziquantel	19	5.3
Afoxolaner	4	1.1
Mebendazole	3	0.8
Sarolaner	3	0.8
Imidocarb dipropionate	2	0.6
Febantel-Pyrantel-Praziquantel	1	0.3

Table 3. cotinued

Medications Given or Prescribed	Freq	%
Diuretics		
Furosemide	7	1.9
Electrolyte & Fluid Therapy		
Oral Rehydration Salts	15	4.2
Electrolytes inj.	3	0.8
Dextrose Powder	9	2.5
Ophthalmic & Ear Medications		
Sodium Hyaluronate	31	8.6
Ciprofloxacin Ophthalmic Solution	16	4.4
Tobramycin Ophthalmic Solution	6	1.7
Ofloxacin + Clotrimazole	2	0.6
Organic ear cleansing solution	1	0.3
Anti-anemia/bleeding		
Tranexamic Acid	6	1.7
Cyanocobalamin, cobalt gluconate, ferric ammonium citrate, nicotinamide inj.	1	0.3
Anticonvulsants & Nerve medications		
Gabapentin	14	3.9
Levetiracetam	12	3.3
Citicoline	3	0.8
Liver		
Betaïne, arginine (hydrochloride), ornithine (hydrochloride), citrulline, sorbitol, metacresol inj.	1	0.3
Vitamins and supplements (non-herbal)		
Ascorbic Acid	7	1.9
Sodium Ascorbate	2	0.6
Sodium Ascorbate+Calcium Ascorbate	11	3.1
Vitamin B-complex-based supplement	47	13.1
Butaphosphan Inj	2	0.6
Multivitamins	10	2.8
Ferrous sulphate-based supplement	4	1.1
Vitamins and supplements (with herbal components)		
Herbal immune health supplement	94	26.1
Herbal respiratory supplement	72	20.0
Carica papaya-based supplement	33	9.2
Herbal liver supplement	10	2.8
Herbal multi-organ supplement	2	0.6
Herbal anti-anemia supplement	1	0.3
GIT Probiotic supplement	1	0.3

DISCUSSION

The nearly 50% positivity rate for CD cases observed in this study suggests that the disease may be endemic in Cebu, Philippines, presenting a significant challenge to canine health. The marked increase in canine distemper cases may be attributed to factors such as heightened disease awareness, improved testing efforts, or a genuine rise in disease incidence (Deem et al., 2000; Whitehouse, 2022). It may also indicate an actual epidemiological rise potentially linked to declining herd immunity or the emergence of new viral strains (Mlanga et al., 2018; Ricci et al., 2021).

Most infected dogs were unvaccinated. The high prevalence of CDV among unvaccinated dogs aligns closely with global findings indicating that unvaccinated animals are highly susceptible to CDV infections (Mohan et al., 2024; Patronek et al., 1995). Furthermore, low vaccination coverage is correlated with the outbreaks of CDV (Martella et al., 2008).

As canine distemper infections were also reported among puppies and juveniles, this is likely due to diminished maternal antibody protection and/or to insufficient or absent vaccination (Whitehouse, 2022; Ricci et al., 2021). It may reflect the critical window of vulnerability during which maternal antibodies decrease, especially when vaccination is incomplete (Wilson et al., 2014). Mixed-breed dogs accounted for the majority of cases, possibly due to their greater numbers (Leisewitz et al., 2001). Dog owners may also prefer them, as they typically require less routine veterinary care than purebred dogs (Udvarhelyi-Tóth et al., 2024). This may be due to genetic factors influencing disease susceptibility.

Ocular and nasal discharges were consistently reported in all infected cases, aligning with classical CDV clinical presentations (Beineke et al., 2015). Interestingly, the low incidence of neurological signs contrasts with findings from other studies, suggesting potential underreporting, diagnostic limitations, or regional strain variability (Mousafarkhani et al., 2023). This may also be due to early detection or intervention, preventing progression to neurological stages (Ricci et al., 2021). Different CDV strains can result in varying clinical manifestations and disease virulence.

Treatment was primarily supportive and symptomatic, commonly involving antibiotics, adjunct supplements, anticonvulsants for neurologic cases, ophthalmic therapy, and immunostimulants. The observed variability in treatment approaches across veterinary clinics highlights the notable lack of standardized protocols within the region and the challenges and complexities of managing CDV in clinical practice (Mlanga et al., 2018). While some variation is expected based on individual case requirements, the wide disparity in therapeutic approaches indicates a need for evidence-based clinical guidelines tailored to local conditions and resource availability (Leisewitz et al., 2001).

The widespread use of broad-spectrum antibiotics, particularly doxycycline and azithromycin, reflects the common occurrence of secondary bacterial infections in CDV cases (Rivera-Martinez et al., 2024). In the absence of specific antiviral therapies for CD, veterinarians rely heavily on supportive treatments designed to bolster immune responses and manage clinical symptoms (Mousafarkhani et al., 2023). The widespread use of herbal supplements reflects local treatment preference (Mousafarkhani et al., 2023; Meazzi et al., 2022). However, their clinical efficacy requires further validation through targeted studies.

Among CDV-positive dogs, co-infections with several parasites and pathogens were observed. The frequent occurrence of co-infections, particularly tick-borne diseases such as ehrlichiosis, underscores the potential for canine distemper virus-induced immunosuppression (Mousafarkhani et al., 2023). This increased susceptibility to secondary pathogens complicates clinical management and worsens patient prognosis. These co-infections in canine distemper may help explain the more severe clinical presentations and variable treatment responses observed (Priestnall & Sykes, 2021). This finding strongly supports the need for comprehensive diagnostic protocols that screen for common co-infections in CDV cases (Shi et al., 2024) and for integrated preventive measures that address both viral and vector-borne diseases (Lanszki et al., 2021).

Overall, the wide variety of therapeutic strategies underscores the complexity of managing CDV cases. This complexity emphasizes the crucial need for standardized treatment protocols and preventive measures, including enhanced vaccination programs (Rivera-Martinez et al., 2024). This will effectively reduce disease prevalence and improve canine health outcomes in Cebu.

The observed association between CDV seropositivity, age, and vaccination status underscores vaccination as the principal prevention-oriented strategy for canine distemper control (WOAH, 2022; Whitehouse, 2022). CDV can affect both young and adult dogs, and higher odds of seropositivity in older animals may reflect cumulative exposure risk over time and the persistence of antibodies in animals that survive earlier infections (Deem et al., 2000; Martella et al., 2008; Costa et al., 2019). Serological assessments in puppies also require consideration of maternally derived antibodies and the "window of susceptibility," during which passive antibodies may provide partial protection but can interfere with vaccine immunogenicity, leaving some puppies inadequately immunized until they complete the primary series and receive appropriate boosters (Dodds, 2021; WOAH, 2022). Collectively, these dynamics suggest that dogs can remain vulnerable to CDV at any age—especially when primary immunization is delayed, interrupted, or insufficiently boosted—thereby reinforcing the need for timely completion of the core vaccination series and adherence to recommended booster schedules to reduce infection risk later in life (Ricci et al., 2021; Mohammad et al., 2022; Whitehouse, 2022).

CD appears to be prevalent in Cebu, Philippines. Results indicated that unvaccinated puppy or juvenile dogs that exhibit clinical signs of CD are most likely to test positive for the disease (Rivera-Martinez et al., 2024). Hence, local veterinarians should strengthen strategies to ensure canine patients receive the core vaccinations. These can include aggressive vaccination campaigns for puppies and juveniles, in which pet owners are educated about the importance of timely vaccination (including booster shots) to reduce the risk of CD infection significantly (Dodds, 2021).

Local veterinary organizations may also implement intensified public education programs on responsible pet ownership, recognizing symptoms, and seeking immediate veterinary care. These programs must highlight the importance of regular veterinary check-ups, quarantine protocols for infected dogs to prevent outbreaks, and proper nutrition, supplements, and hygiene to bolster immunity (Rojas-Sanchez et al., 2024). Stray dog population control may also be encouraged to reduce disease reservoirs (Abdulkarim et al., 2021).

For local veterinarians, establishing standardized, centralized reporting protocols across Cebu's veterinary clinics can help monitor disease trends more effectively. This will allow timely interventions and better resource allocation (Chaudhari et al., 2022).On the other hand, local veterinarians may establish standardized diagnostic and treatment protocols for CDV cases. They may adopt comprehensive diagnostic practices that screen for common co-infections. It may also emphasize supportive care, secondary infection management, and management of clinical signs.

Establishing local practice standards can help new veterinary practitioners implement suitable protocols in the area (Smith et al., 2022). Thishelps them differentiate CDV from other diseases, improving diagnostic accuracy. An integrated treatment approach addressing co-infections can also be integrated, which would likely enhance recovery rates and treatment outcomes. This can include tick and flea control and routine antiparasitic preventatives to reduce disease burden. Routine CDV testing may be encouraged for dogs presenting with respiratory or neurological symptoms, especially in endemic areas.

Collaboration between veterinary clinics, local government units, government and veterinary organizations, and community organizations may be strengthened to manage stray dog populations (Airikkala-Otter et al., 2022). These can include conducting low-cost vaccination drives, particularly in low-income areas, and requiring core vaccination to mitigate the spread of CD and substantially increase herd immunity.

Further research and disease surveillance should assess variations in canine distemper virus strains in the Philippines to guide vaccine use and development (Mousafarkhani et al., 2023). It may also include antibiotic resistance monitoring, given the widespread use of doxycycline and azithromycin. Herbal supplements should be evaluated in clinical and field trials to assess their effectiveness in conjunction with the disease treatment (Cordero, 2022).

As the study relied on clinical records and convenience sampling, and the clinical environments were not standardized, information may be incomplete, and underreporting is possible, reflecting Berkson's fallacy (Stockinger et al., 2021; Brown, 1976). Moreover, the results were specific to Cebu and may not represent the entire Philippines. Further studies may include the nationwide prevalence of the CD to fully appreciate the impact of the CD on canine health in the country.

CONCLUSION

CD was prevalent in the studied canine cases in Cebu, Philippines. It may infect all breeds and sexes, but adult dogs with no or incomplete CDV vaccination appear to be at higher risk. Hence, the importance of completing the core canine vaccinations at a younger age is emphasized. Strengthening preventive measures, client education, and standardized treatment protocols are essential for reducing CDV morbidity and mortality in Cebu, Philippines.

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Author Contribution

APY conceptualized the study, collected data, analyzed and finalized the manuscript. GBS, MMSET, and SAM helped in the data collection and manuscript preparation. GAB, MTLA, SLG,RHD, RHDY, GELU, HPP and MBB helped in the conceptualization and manuscript finalization.

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Availability of Data and Materials

Data can be made available upon request.

Ethical Considerations

The study was in accordance with Philippine animal welfare standards. Exemption was sought and approved by the CTU-IACUC as no live animals were handled and no data relevant to the pet owners were gathered.

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