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Temporal and spatial epidemiology of canine monocytic ehrlichiosis in Nueva Ecija, Philippines

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ABSTRACT: Canine monocytic ehrlichiosis (CME) is a vector-borne disease that affects dogs. This study characterized CME epidemiological profiles by examining associations with age, sex, breed, clinical manifestations, acaricide use, and case distribution in veterinary clinics in Nueva Ecija, Philippines. A total of 1,117 CME-positive cases were collected from eight clinics in Cabanatuan, Muñoz, San Jose, and Gapan City between 2021 and 2022. Diagnosis used commercial rapid test kits. Statistical analyses revealed significant associations between CME prevalence and age, breed, and patient demographics. Cabanatuan City reported the highest number of cases (n = 508). Sex and seasonal variation showed no significant associations with CME occurrence, although cases increased during the hot months (March–June).

Keywords:
canine monocytic ehrlichiosis, disease profiling, spatio-temporal, Nueva Ecija, Philippines

■ INTRODUCTION

Profiling canine monocytic ehrlichiosis (CME) provides insights into disease prevalence and risk factors, informing control strategies in Nueva Ecija, Philippines. *Ehrlichia* spp. are intracellular bacteria infecting humans and animals, with *E. canis* as the CME agent. Clinical manifestations vary by host immunity and breed (Cohn 2003). Dogs are vulnerable to tick-borne infections and act as reservoirs for pathogens (Tarafder & Samad 2010). CME spreads through *Rhipicephalus sanguineus* saliva (Fourie *et al*. 2013). Delayed diagnosis may cause significant morbidity, despite antimicrobial therapy (Rodino *et al*. 2020).

Veterinary clinics in Nueva Ecija's urban centers provide diagnostic services for animal diseases. Reliable CME prevalence data enables preventive measures (Ybañez *et al*. 2016), while laboratory records help characterize disease trends (Lau *et al*. 2014). Despite CME's endemicity in the Philippines, demographic analyses in Nueva Ecija remain limited. This study aimed to characterize CME epidemiology by analyzing cases, host factors, and clinical profiles.

■ MATERIALS AND METHODS

A cross-sectional retrospective study profiled canine monocytic ehrlichiosis (CME) cases from veterinary clinics in Nueva Ecija, Philippines (2021-2022). The medical records of dogs with positive CME diagnostic test results were included. Participating clinics required four years of establishment. Records from other cities, outside the study period, or non-CME diseases were excluded. Data on age, sex, breed, clinical signs, acaricide use, diagnosis date, and clinic location were compiled using Excel. Categorical variables were summarized using descriptive statistics. The association between CME and variables was analyzed using chi-square tests ($P < 0.05$). The spatiotemporal distribution was assessed through prevalence calculations and visualization using ArcGIS and Excel.

■ RESULTS AND DISCUSSION

A total of 1,117 CME cases from Cabanatuan, Muñoz, San Jose, and Gapan City (2021-2022) were diagnosed using rapid tests, with results showing profiles by age, sex, breed, acaricide use, signs, and distribution (Table 1).

Demographic Characteristics: Dogs ≥13 months comprised 55.4% of CME cases, followed by unknown (16.0%), 0-6 months (15.1%), and 7-11 months (13.4%). Males accounted for 50.9% of the population, females for 40.3%, and 8.9% undocumented. Toy breeds were the most common (49.8%), followed by unknown (13.2%), working (8.9%), and others (28.1%) (Scandurra 2018).

Acaricide Use and Tick Exposure: 21.1% of dogs received acaricides, 38.9% had no record, and 40.1% were unknown. Only 5% of ticks are present on hosts (Dantas-Torres 2008). This study found that 19.9% of dogs had tick infestation, which was lower than the previous 52.7%. The absence of ticks during examination does not exclude CME infection.

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Table 1. Dogs with laboratory-confirmed canine monocytic ehrlichiosis (n = 1,117) in Nueva Ecija, Philippines, 2021–2022.

Parameters	Details	Frequency; (%)
Age	0-6 months	169; (15.13)
	7-11 months	150; (13.43)
	>12 months	619; (55.42)
	Unknown	179; (16.03)
	χ^2	10.310
	p-value	0.112
Sex	Male	568; (50.90)
	Female	450, (40.29)
	Unknown	99; (8.86)
	χ^2	29.236
	p-value	0.001
Breeds	Toy	555; (46.69)
	Working	99; (13.25)
	Mongrel	77; (6.89)
	Sporting	72; (6.45)
	Non-sporting	55; (4.92)
	Herding	46; (4.12)
	Terriers	40; (3.58)
	Hounds	25; (2.24)
	Unknown	148; (8.86)
	χ^2	164.185
	p-value	0.001
History	Acaricide records	236; (21.13)
	No-acaricide records	483; (38.90)
	Unknown	448; (40.11)
Seasons	Rainy (Jul-Oct)	283; (25.30)
	Cool dry (Nov-Feb)	374; (33.50)
	Hot dry (Mar-Jun)	460; (41.20)
	χ^2	42.688
	p-value	0.001
Year	χ^2	28.129
	p-value	0.171
Municipalities	Cabanatuan	508; (14.17)
	χ^2	187.700
	p-value	0.001

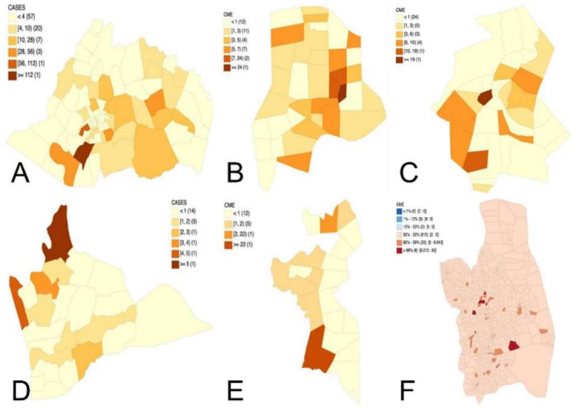

Figure 1. Spatial distribution of laboratory-confirmed canine monocytic ehrlichiosis cases in (A) Cabanatuan City, (B) Muñoz City, (C) San Jose City, (D) Gapan City, (E) Palayan City, and (F) municipalities of Nueva Ecija, Philippines, during 2021–2022.

Clinical Manifestations: Common clinical signs were lethargy (43.1%), inappetence (40.5%), vomiting (13.9%), and epistaxis (12.9%). CME is a multisystemic disease with acute and chronic forms (Dubie *et al*. 2014), lethargy and gastrointestinal symptoms (Sainz *et al*. 2015).

Temporal Distribution: CME cases peaked in the hot/dry season (March-June) at 41.2%, with cold dry (33.5%) and rainy seasons (25.3%), coinciding with *R. sanguineus* activity. *E. canis* is endemic to tropical regions (Costa *et al*. 2007), where *R. sanguineus* maintains year-round infestations (Lorusso *et al*. 2010).

Spatial Distribution: CME distribution varied across cities, with Cabanatuan showing highest cases (n = 508), followed by Muñoz, San Jose, Gapan, and Palayan (Figure 1). Dense populations and tick conditions drive the burden of Cabanatuan (Marquez *et al*. 2021).

Statistical Associations: Statistical analysis showed no link between CME and age or sex (Sainz *et al*. 2015; Costa *et al*. 2007). The number of cases increased during the warmer months. Geographic analysis revealed varying risks.

■ CONCLUSION

Temporal-spatial analysis showed seasonal and geographic patterns of canine monocytic ehrlichiosis, confirming host and environmental factors in disease transmission and supporting targeted control.

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