Asian J. Med. Biol. Res. 2025, 11(4), 135-142; https://doi.org/10.3329/ajmbr.v11i4.84323

Asian Journal of
Medical and Biological Research
ISSN 2411-4472 (Print) 2412-5571 (Online)
https://www.ebupress.com/journal/ajmbr/

Article

Prevalence and associated risk factors of Feline Panleukopenia Virus (FPV) in cats of Faridpur district, Bangladesh

Md. Kamran Khan[1], Md. Kamruzzaman Akimul[2], Nasrin Akter Sumona[3], Wahedul Karim Ansari[2,4] and Md. Yeasin Arafat[2*]

[1]Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Barishal-8210, Bangladesh
[2]Department of Microbiology and Public Health, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Barishal-8210, Bangladesh
[3]Department of Pathology and Parasitology, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Barishal-8210, Bangladesh
[4]Department of Medical Sciences, The Catholic University of Korea, Seoul-06591, South Korea

*Corresponding author: Md. Yeasin Arafat, Department of Microbiology and Public Health, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Bangladesh. E-mail: arafatyeasin@pstu.ac.bd

Received: 11 September 2025/Accepted: 23 December 2025/Published: 31 December 2025

Abstract: Feline panleukopenia is a highly transmissible and often fatal viral disease that particularly affects kittens. This study aimed to determine the prevalence of feline panleukopenia virus (FPV) among cats and evaluate associated risk factors. A cross-sectional study was conducted on clinically suspected cases from a selected region of Bangladesh. Data were collected using a structured questionnaire, and FPV infection was confirmed through clinical signs and rapid diagnostic tests. Fisher's exact test was employed for statistical analysis to assess the associations. A total of 1,116 cat cases were retrieved, of which 262 were clinically diagnosed with FPV, resulting in an overall prevalence rate of 23.48%. FPV cases were most commonly observed in young, male, non-immunized Persian cats during the winter season. The highest prevalence was recorded in Persian breeds (30.25%), cats aged 0–6 months (29.46%), males (23.98%), during winter (26.22%), and in non-vaccinated cats (27.97%). These findings indicate a significant burden of FPV in the study area, underscoring the importance of future nationwide surveillance. The study highlights the critical need for targeted vaccination programs, early diagnosis, and preventive measures—particularly for young, non-vaccinated, and high-risk breeds—to reduce FPV incidence and mortality in cats. These findings can inform public health strategies and guide future nationwide surveillance efforts in Bangladesh.

Keywords: cross-sectional epidemiology; risk factor analysis; rapid diagnostic testing; vaccination status; seasonal variation

1. Introduction

Feline panleukopenia is a highly contagious and potentially fatal endemic disease of cats caused by the feline panleukopenia virus (FPV) (Raja *et al*., 2024). This disease is endemic in the cat population in Bangladesh and is associated with high morbidity and mortality rates for all members of the Felidae family (Mende *et al*., 2014; Kabir *et al*., 2023). FPV, belonging to the Parvoviridae family, is related to canine parvovirus type 2 (CPV-2) and other parvoviruses found in carnivores (Decaro *et al*., 2013). The virus predominantly affects rapidly dividing cells, such as those in the bone marrow and lymphoid tissues, leading to leukopenia and immunosuppression (Barrs, 2019). Since the 20th century, it has been recognized that cats can suffer from FPV-induced enteritis alongside severe panleukopenia, both of which are associated with significant morbidity and mortality rates. Feline panleukopenia-like viruses have been isolated from cats, raccoons, mink, and Arctic foxes, showing considerable genetic similarity. In addition to FPV, new antigenic variants of the original CPV can also replicate and cause disease in cats (Sykes, 2014).

FPV primarily affects cats under one year of age, but the disease can also occur in unvaccinated or inadequately vaccinated cats of any age. Morbidity and mortality peak around 5 months due to diminishing maternal-derived antibodies (Litster and Benjanirut, 2014; Rehme *et al*., 2022). Transmission of FPV predominantly occurs via the fecal-oral route, with indirect contact through contaminated fomites being the most common pathway. Additionally, intrauterine transmission and infection of neonatal kittens can occur (Truyen *et al*., 2009). The virus is environmentally resilient, surviving for months in contaminated surroundings, which facilitates indirect transmission (Stuetzer and Hartmann, 2014). FPV infection can present as either clinical or subclinical. The severity of clinical disease is influenced by various factors, such as age and immunity. The most prominent clinical signs include acute fever, vomiting, lethargy, diarrhea, and dehydration. Serological studies indicate that subclinical cases are also quite frequent, particularly in unvaccinated cats (Barrs, 2019).

It's critical to diagnose FPV infections quickly, as clinical history and indications alone do not always confirm a diagnosis; therefore, laboratory testing is urgently required. General lab tests like polymerase chain reaction, ELISA, and immunofluorescence antibody tests take longer to yield results. Consequently, rapid and sensitive tests, such as immunochromatography, which can be performed by veterinarians or lab workers, are gaining interest (Mosallanejad *et al*., 2009).

There is no specific treatment, but supportive therapy and good nursing significantly decrease mortality rates. Furthermore, nutritional supplements, antiemetic medications, management of dehydration, correction of electrolyte imbalances, and antibiotics to control subsequent bacterial infections have been suggested (Truyen *et al*., 2009; Sykes, 2014). Given the highly fatal nature of this disease, vaccination is essential for prevention (Weidinger *et al*., 2024). The commercially available vaccines for FPV include live attenuated and inactivated vaccines (Wang *et al*., 2025). Two injections are recommended, the first at 8–9 weeks of age and the second 3–4 weeks later (at a minimum of 12 weeks of age), followed by a booster one year later (Truyen *et al*., 2009). As FPV is a highly contagious and fatal disease for cats, detailed studies on the disease are important for its prevention and control. Earlier studies in Bangladesh have reported varying prevalence rates of FPV, depending on the season, breed, sample size, and diagnostic methods used (Chisty *et al*., 2020; Hossen *et al*., 2024; Jubaer *et al*., 2024). These discrepancies highlight the need for updated region-specific data to understand the epidemiological features.

FPV poses a significant health threat to cats, particularly young and unvaccinated individuals, due to its high transmissibility, environmental resilience, and associated morbidity and mortality. Despite its recognized impact, region-specific epidemiological data on FPV prevalence and associated risk factors remain limited in Bangladesh, creating challenges for effective prevention and control strategies. This study hypothesizes that factors such as age, breed, vaccination status, season, and rearing type significantly influence FPV infection in cats. Accordingly, the research seeks to answer, what is the prevalence of FPV in cats in the Faridpur district, and which demographic, environmental, and management factors are associated with infection? The objective is to determine the prevalence of FPV and identify key risk factors that contribute to disease occurrence. The findings are expected to inform targeted vaccination programs, improve early diagnosis, and guide preventive measures, thereby reducing FPV incidence and mortality and supporting future nationwide surveillance and control efforts.

2. Materials and Methods

2.1. Ethical approval and informed consent

This research did not require ethical approval from the university. Clinical signs in cats were observed for the diagnosis and subsequent treatment of FPV, with assistance from veterinary officials at the District Veterinary Hospital (DVH) after the owners provided verbal consent.

2.2. Study area and periods

The study was conducted in the Faridpur district of Bangladesh, with data collection occurring from November 2023 to March 2024 (Figure 1).

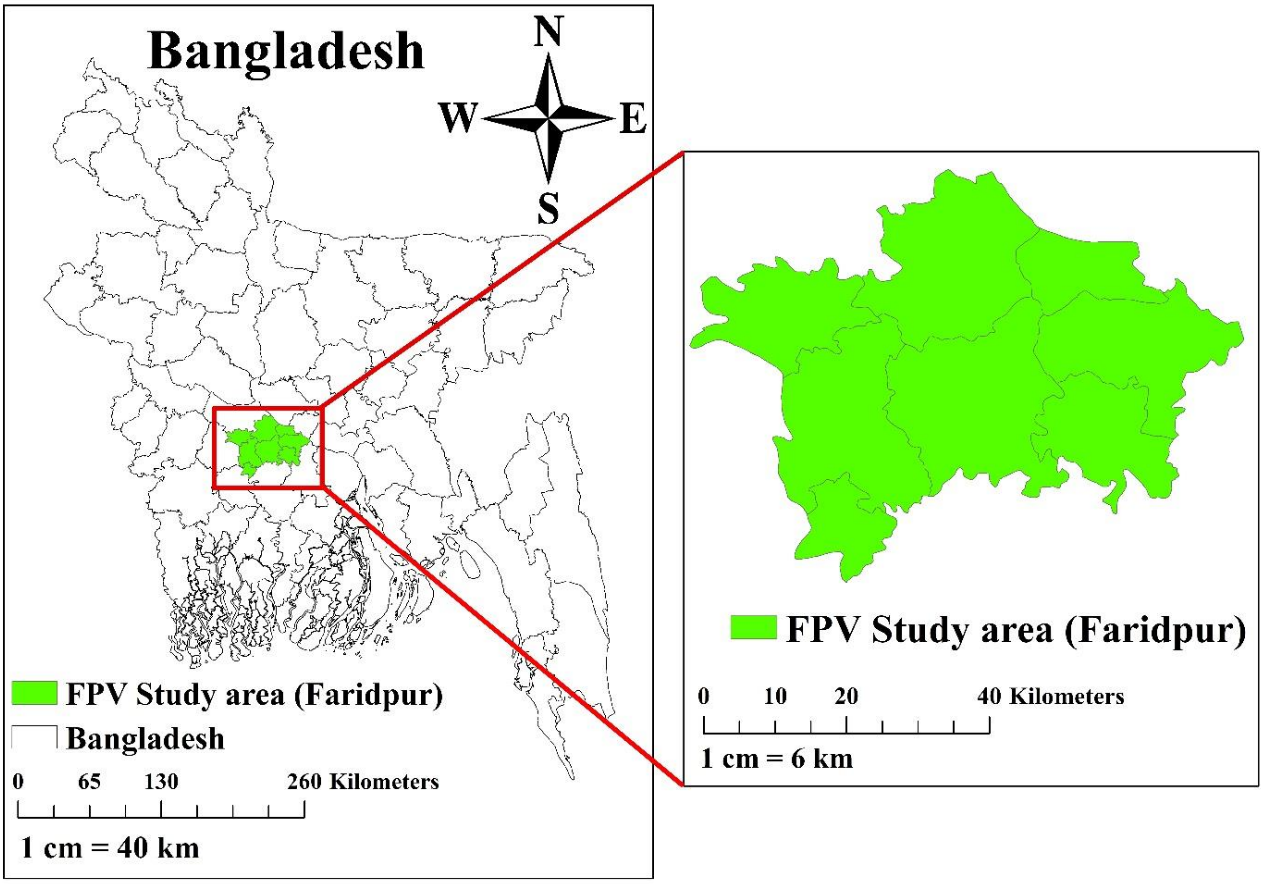

Figure 1. Geographic location of the study area for FPV in Faridpur district, Bangladesh.

2.3. Samples and sample size

The research focused on naturally suspected cases of FPV in cats that visited the veterinary hospital during the study period. All animals were selected from the Faridpur area, including those brought in from surrounding locations. During the study period, a total of 1,116 diseased cats were treated for various illnesses in Faridpur, of which 262 were found to be infected with FPV.

2.4. Clinical and physical examination

All the studied cats presented at the veterinary hospital in Faridpur underwent physical examinations using standard clinical methods. These methods included palpation to assess abdominal pain or organ enlargement, percussion to evaluate the presence of fluid or gas, and auscultation to detect abnormalities in heart and lung sounds, all of which aided in the preliminary diagnosis of FPV infection.

2.5. Diagnosis of FPV cases and vaccination history

Among all diseased cats presented to the veterinary hospital, a presumptive diagnosis of FPV was made based on the owner's complaints, clinical history, observable clinical signs, and results from rapid test kits. The primary clinical signs included diarrhea, frequent vomiting, weakness, high fever, and varying degrees of dehydration. Diagnosis was initially guided by these clinical presentations and subsequently confirmed using rapid FPV test kits. Although laboratory tests such as PCR or hematological analyses provide definitive results, they are often time-consuming and not always feasible in field settings. Previous studies have similarly relied either on clinical signs alone or a combination of clinical signs and rapid diagnostic tests (Islam *et al*., 2010; Runa *et al*., 2016; Chisty *et al*., 2020). In the present study, FPV diagnosis was based on both clinical observations and rapid diagnostic testing (Figure 2). Each owner was asked about their cat's previous vaccination history, which was noted in the questionnaire.

Figure 2. Representing images related to the study; (A) a cat showing some typical signs of FPV; (B) diagnosis of FPV by using a rapid test kit; (C) vomiting sample of FPV affected cat; (D) diarrhea (loose feces) of FPV affected cat.

2.6. Therapeutic management of FPV

Feline panleukopenia cases were primarily managed through supportive therapy, focusing on controlling secondary infections, correcting dehydration and electrolyte imbalances, and alleviating gastrointestinal symptoms. In this study, supportive treatment included fluid therapy (5% dextrose saline and 0.9% saline), antiemetics (ondansetron), proton pump inhibitors (pantoprazole or esomeprazole), antibiotics (metronidazole and ceftriaxone), and multivitamins. Proton pump inhibitors were specifically administered to mitigate gastritis, in accordance with findings from previous research (Daure *et al*., 2017).

2.7. Data collection

A total of 1,116 cats were documented using a structured questionnaire survey, and data on clinically suspected FPV cases were collected. Information was obtained directly from cat owners and corroborated with hospital records from Faridpur, Bangladesh. Data encompassed owners' complaints, anamnesis of the cats, clinical history, and physical examination findings—including inspection, temperature measurement, auscultation, and respiratory assessment—along with observed clinical signs in the suspected cases. The questionnaire employed for data collection is provided in the supplementary material.

2.8. Statistical analysis

The collected data were entered into a Microsoft Excel 2013 spreadsheet, where they were cleaned, coded, sorted, and verified for accuracy. FPV prevalence was then calculated for the Faridpur district. To assess the statistical associations between FPV occurrence and various factors—such as source, age, sex, breed, and rearing system—Fisher's exact test was employed.

3. Results

3.1. Prevalence of FPV in different ages

A total of 1,116 cats were examined in this study, of which 262 were clinically diagnosed with FPV, resulting in an overall prevalence of 23.48%. The study also evaluated the therapeutic approaches used to manage FPV and their effectiveness in infected cats in Faridpur, Bangladesh. Age-specific analysis revealed the highest prevalence of FPV (29.46%) in cats aged 0–6 months, compared to 22.90% in those aged 7–18 months and 9.14% in cats older than 18 months (Table 1; Figure 3A).

Table 1. Prevalence of FPV in cats by age, sex, breed, season, rearing type, and vaccination status (N=1116).

Category	No. of affected animals	No. of FPV infected cats	Prevalence (%)	Chi-square test	*P*-value
Age (months)					
<6 months	465	137	29.46%		
7-18 months	476	109	22.90%	29.38	4.18×10^{-7}*
>18 months	175	16	9.14%		
Sex					
Male	613	147	23.98%	0.14	0.713
Female	503	115	22.86%		
Breed					
Local	791	177	22.38%		
Persian	119	36	30.25%	3.58	0.167
Cross	206	49	23.79%		
Season					
Winter	698	183	26.22%	7.39	0.0066*
Spring	418	79	18.90%		
Rearing type					
Domesticated	797	201	25.22%	4.38	0.0363*
Rescued	319	61	19.12%		
Vaccination status					
Non-vaccinated	883	247	27.97%	46.40%	9.65×10^{-12}*
Vaccinated	233	15	6.44%		

N.B.: $P \leq 0.05$ is statistically significant (*)

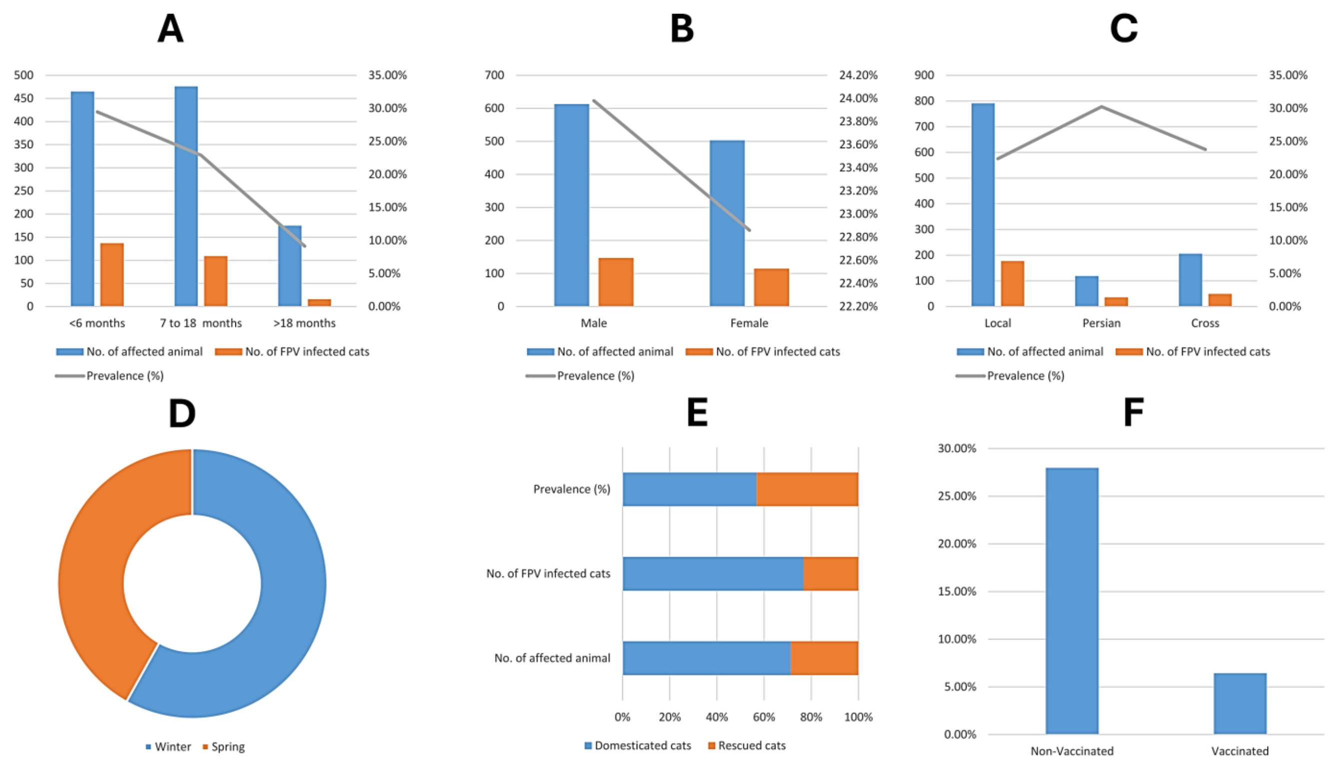

Figure 3. Graphical summary of FPV prevalence in cats, (A) age-wise distribution, (B) sex-wise comparison, (C) breed-wise prevalence, (D) seasonal variation, (E) domesticated vs. rescued cats, (F) vaccination-based distribution.

3.2. Prevalence of FPV in different sex groups, breeds, seasons, types and vaccinated cats

Although male cats exhibited a slightly higher FPV prevalence (23.98%) compared to females (22.86%), this difference was not statistically significant, suggesting that sex does not influence susceptibility to FPV in the studied population (Table 1; Figure 3B). Among the 262 cats diagnosed with FPV, the prevalence was 22.38% in local cats, 30.25% in Persian cats, and 23.79% in crossbred cats (Table 1; Figure 3C). In the Faridpur district, FPV prevalence was higher during the winter season (26.22%) compared to spring (18.90%) (Table 1; Figure 3D). Domesticated cats exhibited a higher susceptibility to FPV, with a prevalence of 25.22%, compared to 19.12% in rescued cats (Table 1; Figure 3E). Non-vaccinated cats showed a markedly higher susceptibility to FPV, with a prevalence of 27.97%, compared to only 6.44% in vaccinated cats (Table 1; Figure 3F).

4. Discussion

This study aimed to assess the prevalence and associated risk factors of FPV in cats presented at a hospital in the Faridpur district of Bangladesh. Islam *et al*. (2010) reported an FPV prevalence of 22.4%, which is comparable to the 23.48% prevalence observed in the present study. In contrast, a study by Chakma *et al*. (2024) reported a lower prevalence of 11.19%. This variation may be attributed to seasonal differences, as Islam *et al*. (2010) conducted their study during the spring. Previous research also indicated more occurrences of FPV during the spring (Jacobson *et al*., 2021).

The present study demonstrated that young cats (<6 months; 29.46%) were the most affected group (Table 1; Figure 3A). This finding is consistent with previous reports documenting FPV prevalence rates of 17.46%, 25.71%, and 26.7% among young cats (Kruse *et al*., 2010; Runa *et al*., 2016; Chakma *et al*., 2024). FPV infection in kittens can lead to mortality rates exceeding 90%, primarily due to the decline of maternally derived immunity before the establishment of vaccine-induced protection (Truyen *et al*., 2009). The *P*-value observed in this study was well below 0.05, indicating a highly significant association between age group and FPV infection.

Male cats (23.98%) exhibited a slightly higher prevalence of FPV than females (22.86%) (Table 1; Figure 3B). This difference is smaller than that reported in a previous study (39.5% in males vs. 30.5% in females) but higher than the prevalence found in another study (11.90% in males vs. 10.66% in females) (Kruse *et al.*, 2010). Although male cats showed a slightly higher prevalence, this difference was not statistically significant (P = 0.713), indicating that sex is not a determining factor for FPV susceptibility. These findings align with previous reports. In the present study, FPV prevalence was highest in Persian cats (30.25%), followed by crossbred cats (23.79%) and local breeds (22.38%) (Table 1; Figure 3C). Earlier studies reported similar FPV prevalence rates: 30% in Persian cats and 40% in crossbred cats (Hossen *et al.*, 2024). In contrast, another study found the highest FPV prevalence in crossbred cats (18.44%), followed by local (10.44%) and Persian breeds (8.3%). However, in the present study, the association between breed and FPV infection was not statistically significant (P = 0.167; Table 1). Additionally, FPV was most frequently observed during the winter season (26.22%), followed by spring (18.90%) (Table 1; Figure 3D). This finding contrasts with Runa *et al.* (2016), which reported a 40.2% FPV prevalence during the winter season.

A recent study by Kabir *et al*. (2023) highlighted the impact of seasonality on FPV prevalence, reporting nearly sixfold higher odds of infection in winter compared to the rainy season. The virus is highly resilient in the environment, persisting for several months and maintaining its infectivity on surfaces, in soil, and in organic materials. This environmental stability facilitates indirect transmission through contaminated fomites, food, water, and bedding, making FPV outbreaks particularly difficult to control in areas with high cat populations or poor sanitation (Truyen *et al*., 2009). The observed association was statistically significant (P = 0.0066; Table 1), indicating a meaningful relationship between FPV infection and seasonal variation, with a higher prevalence in winter compared to spring.

In terms of rearing type, 25.22% of domesticated cats and 19.12% of rescued cats were affected (Table 1; Figure 3E). This pattern contrasts with a previous report documenting FPV prevalence of 62.1% in domesticated cats and 37.9% in rescued cats (Kruse *et al*., 2010). This discrepancy may be attributed to the relatively lower number of rescued cats in the Faridpur district. Consistently, a study in Bangladesh reported by Chisty *et al*. (2020) found that all affected cats in their cohort were domesticated. In the present study, local breeds (38.42%) were more susceptible than other breeds, aligning with previous findings that reported 24.2% of affected cats as local and 10.5% as exotic breeds, likely reflecting the higher abundance of local cats in the study area. The association between cat type (domesticated vs. rescued) and FPV infection was statistically significant (P = 0.0363; Table 1), indicating a meaningful difference in infection rates between the two groups.

Vaccinated cats exhibited a significantly lower prevalence of FPV (6.44%) compared to non-vaccinated cats (27.97%) (Table 1; Figure 3F). Similar trends have been reported in previous studies, which found that vaccinated cats were considerably less susceptible to FPV infection (Chisty *et al*., 2020; Jubaer *et al*., 2024). This protective effect is likely due to the development of immunity following vaccination, which also leads to improved recovery rates in vaccinated cats compared to their non-vaccinated counterparts (Jakel *et al*., 2012). The extremely low *P*-value ($P= 9.65 \times 10^{-12}$) indicates a highly significant association between vaccination status and FPV infection, underscoring the critical role of vaccination in disease prevention.

5. Conclusions

The study offers valuable epidemiological insights into the prevalence of Feline Panleukopenia Virus (FPV) infection in cats within a specific region of Bangladesh. The findings reveal important associations with age, breed, and seasonal variations. Although no significant association was identified with sex, the increased susceptibility observed in younger and Persian cats highlights the necessity for targeted preventive strategies. This study can inform future surveillance and vaccination programs. Additionally, nationwide longitudinal studies that incorporate molecular analysis are recommended to better understand the epidemiological status of the virus in the cat population.

Acknowledgements

The authors would like to express their sincere gratitude to the Faculty of Animal Science and Veterinary Medicine at Patuakhali Science and Technology University, Barishal-8210, Bangladesh, for facilitating the internship placement in Faridpur district. They also extend special thanks to the cat owners of Faridpur district for their generous cooperation. This study did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability

The data supporting the findings of this study are included in this manuscript.

Conflict of interest

None to declare.

Authors' contribution

Md. Kamran Khan: conceptualization, study design, disease diagnosis, data collection, organization, and analysis, writing of the original draft; Md. Kamruzzaman Akimul: data finalization, data analysis, manuscript writing, editing, and revision of the manuscript; Nasrin Akter Sumona: data finalization, data analysis, manuscript writing, and editing; Wahedul Karim Ansari: manuscript writing, editing, and revision of the manuscript; Md. Yeasin Arafat: supervision, conceptualization, data organization, analysis, and interpretation, writing of the original draft, editing, and revision of the manuscript. All authors have read and approved the final manuscript.

References

Barrs VR, 2019. Feline Panleukopenia: a re-emergent disease. Vet. Clin. North Am. Small Anim. Pract., 49: 651-670.

Chakma A, Y Biswas, MK Akimul, MS Rahman, MR Karim and MEH Kayesh, 2024. Investigation of clinical diseases and surgical cases in cats of Dhaka city, Bangladesh. Vet. Sci. Res. Rev., 11: 1-7.

Chisty NN, JP Belgrad, AA Sattar, S Akter and MA Hoque, 2020. Clinico-epidemiological investigation of feline panleukopenia and parvoviral enteritis in the two largest pet hospitals in Bangladesh. J. Adv. Vet. Anim. Res., 7: 726-733.

Daure E, L Ross and CR Webster, 2017. Gastroduodenal ulceration in small animals: part 2. proton pump inhibitors and histamine-2 receptor antagonists. J. Am. Anim. Hosp. Assoc., 53: 11-23.

Decaro N, C Desario, F Amorisco, M Losurdo, G Elia, A Parisi, G Ventrella, V Martella and C Buonavoglia, 2013. Detection of a canine parvovirus type 2c with a non-coding mutation and its implications for molecular characterisation. Vet. J., 196: 555-557.

Hossen MI, SRA Boishakhe and MEH Kayesh, 2024. Epidemiology of feline panleukopenia virus infection in domestic cats of Barishal District, Bangladesh. Hosts and Viruses, 11: 86-93.

Islam MA, SA Rony, MJ Uddin and AKMA Rahman, 2010. Antigenic detection of feline panleukopenia virus in local breed cats at Tangail district in Bangladesh. Int. J. Biol. Sci., 2: 25-28.

Jacobson LS, KJ Janke, J Giacinti and JS Weese, 2021. Diagnostic testing for feline panleukopenia in a shelter setting: a prospective, observational study. J. Feline Med. Surg., 23: 1192-1199.

Jakel V, K Cussler, KM Hanschmann, U Truyen, M König, E Kamphuis and K Duchow, 2012. Vaccination against Feline Panleukopenia: implications from a field study in kittens. BMC Vet. Res., 8: 62.

Jubaer, MM Rahman and MS Ahmed, 2024. Seroprevalence, risk factors, and therapeutic response of feline panleukopenia in household cats at Savar Upazila of Dhaka district in Bangladesh. Asian J. Med. Biol. Res., 10: 141-147.

Kabir A, T Habib, CS Chouhan, J Hassan, AKMA Rahman and KHMNH Nazir, 2023. Epidemiology and molecular characterization of Feline panleukopenia virus from suspected domestic cats in selected Bangladesh regions. PLoS One, 18: e0282559.

Kruse BD, S Unterer, K Horlacher, C Sauter-Louis and K Hartmann, 2010. Prognostic factors in cats with feline panleukopenia. J. Vet. Intern. Med., 24: 1271-1276.

Litster A and C Benjanirut, 2014. Case series of feline panleukopenia virus in an animal shelter. J. Feline Med. Surg., 16: 346-353.

Mende K, B Stuetzer, C Sauter-Louis, T Homeier, U Truyen and K Hartmann, 2014. Prevalence of antibodies against feline panleukopenia virus in client-owned cats in Southern Germany. Vet. J., 199: 419-423.

Mosallanejad B, R Avizeh and MG Najafabadi, 2009. Antigenic detection of Feline Panleukopenia Virus (FPV) in diarrhoeic companion cats in Ahvaz area. Iran. J. Vet. Res., 10: 289-293.

Raja P, KS Mallika, VY Viva, M Parthiban, G Sathish, V Vinitha, S Parthiban and GD Raj, 2024. Complete genome sequence and phylogenetic analysis of feline panleukopenia virus from India. VirusDisease, 35: 34-40.

Rehme T, K Hartmann, U Truyen, Y Zablotski and M Bergmann, 2022. Feline panleukopenia outbreaks and risk factors in cats in animal shelters. Viruses, 14: 1248.

Runa NS, AS Uddin, H Asmaul, RN Yesmin, Y Sabina, ATM Badruzzaman, MS Islam, N Monira, AK Jahengir and MM Rahman, 2016. Prevalence of diseases in pet animals at Dhaka city of Bangladesh. J. Vet. Anim. Sci., 3: 88-92.

Stuetzer B and K Hartmann, 2014. Feline parvovirus infection and associated diseases. Vet. J., 201: 150-155.

Sykes JE, 2014. Feline panleukopenia virus infection and other viral enteritides. In: Canine and Feline Infectious Diseases. Edited by: Sykes JE, Elsevier, pp. 187-194.

Truyen U, D Addie, S Belák, C Boucraut-Baralon, H Egberink, T Frymus, T Gruffydd-Jones, K Hartmann, MJ Hosie, A Lloret, H Lutz, F Marsilio, MG Pennisi, AD Radford, E Thiry, and MC Horzinek, 2009. Feline panleukopenia. ABCD guidelines on prevention and management. J. Feline Med. Surg., 11: 538-546.

Wang T, H Wu, Y Wang, Y Guan, Y Cao, L Wang, M Wang, F Tan, W Pang and K Tian, 2025. Virus-like particle vaccine for feline panleukopenia: immunogenicity and protective efficacy in cats. Vaccines, 13: 684.

Weidinger AK, K Hartmann, D Barutzki, U Truyen, AAE Wahed, Y Zablotski and M Bergmann, 2024. Antibody response after feline panleukopenia virus vaccination in kittens with and without intestinal parasites. J. Feline Med. Surg., 26: 1098612X241264731.