



# Clinical investigation and epidemiological study of feline panleukopenia in cats in Meherpur Sadar, Bangladesh

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## ABSTRACT

Feline panleukopenia (FPV), caused by the highly contagious feline parvovirus, poses a significant threat to domestic cats. This study aimed to investigate the clinical presentation, epidemiological features, and management practices of feline panleukopenia in domestic cats in Meherpur Sadar Upazila, Meherpur. A total of 133 clinically affected cats were examined from December 2023 to May 2024, with FPV accounting for 52.6% (n=70) of all cases, followed by respiratory infections (13.5%), parasitic infestations (12.8%), gastrointestinal issues (8.3%), and skin disorders (7.5%). Monthly analysis revealed the highest prevalence in February (28.57%). Persian cats (60%) were more commonly affected than Golden cats (40%), while kittens ( $\leq 4$  months) exhibited the highest prevalence (42.86%). Female cats were more frequently affected (67.14%) than males (32.86%). Most cases (72.86%) occurred in households with no previous FPV cases. Cats with regular contact with others (77.14%) had a higher prevalence, highlighting the role of exposure. Non-vaccinated cats showed a significantly higher prevalence (85.71%) than vaccinated ones (14.29%), emphasizing the importance of vaccination. Vomiting was the most common clinical sign (94.29%), while diarrhea was less frequent (17.14%). Veterinarians managed 58.57% of cases, followed by quacks (34.29%) and owners (7.14%). Ceftriaxone was the most prescribed antibiotic (84.29%). This study highlights the high prevalence of feline panleukopenia in Meherpur, underscoring the critical role of vaccination and improved management in controlling the disease.

## 1. Introduction

Infection with feline parvovirus (FPV) causes feline panleukopenia (FPL), a highly contagious disease that affects members of the Felidae family (Hossen et al., 2024; Jubaer et al., 2024; Kabir et al., 2023). Recognized as both an endemic and epizootic pathogen for domestic cats, this single-stranded DNA virus primarily targets rapidly dividing cells in the bone marrow, lymphoid tissues, and intestines (Zenad & Radhy, 2020). The resulting clinical syndrome is characterized by fever, vomiting, diarrhoea, and neutropenia, which often predispose affected cats to secondary bacterial infections, dehydration, and coagulation disorders such as disseminated intravascular coagulation (DIC) (Zenad & Radhy, 2020). Mortality rate and case fatality rate were 23.66% and 58.49%, with sudden death frequently reported in severe cases (Hossen et al., 2024).

Feline panleukopenia, often referred to as the "cat plague," is one of the most significant threats to domestic cats due to its ability to persist in the environment for extended periods (Sykes, 2013). The virus remains infective for up to a year or more on contaminated surfaces (Zenad & Radhy,

2020). Transmission occurs through direct contact with infected animals or indirectly via contaminated people, equipment, or inadequately disinfected environments (Pandey, 2022.) While vaccination has significantly reduced the prevalence of feline panleukopenia, outbreaks continue to occur, particularly in multi-cat households, shelters, and areas with low vaccination coverage (Pandey, 2022).

In Bangladesh, the spread of feline panleukopenia is notably high, particularly among small-scale and backyard cat owners who are often unaware of proper vaccination schedules and management practices (Rahman et al., 2010). This issue is compounded by limited access to veterinary services in rural areas, such as Meherpur Sadar Upazila. Despite the significant risks posed by feline panleukopenia in this region, there is little data on the clinical presentations, treatment practices, and outcomes of infected cats. The management of feline panleukopenia cases at local veterinary hospitals remains poorly documented, leaving a critical gap in understanding the disease's total impact on domestic cat populations.

This study was conducted to assess the clinical manifestations of feline panleukopenia in cats and evaluate the treatment approaches followed by veterinarians in Meherpur Sadar Upazila. Furthermore, it aims to explore the socio-economic factors influencing the spread of feline panleukopenia and the challenges associated with its management and prevention in this local context. By profiling the clinical status of affected cats and analyzing current treatment protocols, the study seeks to address existing knowledge gaps and provide evidence-based recommendations for improving the diagnosis, treatment, and prevention of feline panleukopenia in Bangladesh.

To the best of our knowledge, no comprehensive research on the clinical management and epidemiology of feline panleukopenia in this region has been undertaken, underscoring the importance of this study in bridging a critical gap in veterinary knowledge and public health policy.

The primary objective of this study was to determine the clinical prevalence and epidemiological distribution of feline panleukopenia among domestic cats in Meherpur Sadar Upazila. Additionally, the study aimed to identify the treatment options and management strategies currently employed for affected cats, while evaluating the socio-economic factors influencing the spread of the disease. These factors include vaccination practices, household care, and the availability of veterinary services. Ultimately, the research sought to provide data-backed recommendations for improving the prevention, diagnosis, and therapeutic management of feline panleukopenia in domestic cats in Bangladesh.

## **2. Materials and Methods**

### **2.1. Description of the study area**

The study was conducted in Meherpur Sadar Upazila, located in Meherpur District in southwestern Bangladesh. The district, with an area of 751.62 km<sup>2</sup>, is bordered by India to the west and south and by Kushtia and Chuadanga districts to the northeast. Known for its fertile agricultural land, the region produces crops such as paddy, jute, wheat, maize, and tobacco (Islam, 2003.) Despite its agricultural productivity, the region lacks sufficient veterinary care services, and the population of domestic cats has increased significantly in recent decades, creating

challenges in managing diseases like feline panleukopenia (FPV).

In recent decades, domestic cat populations in both urban and rural areas of Meherpur have increased significantly, creating a rising demand for veterinary services. However, the region still faces challenges in providing adequate veterinary care, particularly as it remains a hotspot for contagious diseases like feline panleukopenia (FPV).

The study was conducted at the Meherpur Upazila Veterinary Hospital (UVH) from December 18, 2023, to May 15, 2024.

### **2.2. Veterinary healthcare services**

Veterinary services in the region are provided by the Upazila Livestock Office (ULO), which consists of one Upazila Livestock Officer, one Livestock Extension Officer (LEO), and supporting staff. Veterinary diagnoses are primarily based on clinical signs and symptoms, and diagnostic tools available at UVH or external laboratories are used for confirmation. Therapeutic and prophylactic treatments are prescribed by the ULO and LEO. Veterinary healthcare in UVHs across Bangladesh is regulated by the Department of Livestock Services (DLS) under the Ministry of Fisheries and Livestock.

### **2.3. Data collection**

Data were collected from cat owners whose pets had a confirmed history of feline panleukopenia (FPL). Owners were interviewed to gather information about their cats, including age, sex, breed, vaccination status, rearing conditions, and any previous illnesses. Comprehensive clinical examinations were conducted to confirm diagnoses. Observations, clinical histories, and examination findings were recorded systematically in the case register maintained by UVH.

The clinical cases were categorized as medicinal, surgical, or gynecological based on the diagnosis. All data were entered into Microsoft Excel 2021, cleaned, and analyzed. Prevalence rates and 95% confidence intervals were calculated using manually inputted formulas in Excel.

### **2.4. Clinical diagnosis**

A structured approach was used to investigate feline panleukopenia (FPV).

#### 2.4.1. Clinical examination

Clinical signs such as stomatitis, oral mucosal erosion, respiratory symptoms, and discharge from the eyes, mouth, and nose were recorded. Additional indicators included the presence of a harsh coat and signs of dehydration.

#### 2.4.2. Body temperature

Rectal thermometry was performed to detect fever, a common early symptom of FPV.

#### 2.4.3. Auscultation

Indirect auscultation using a stethoscope was conducted to assess lung sounds and tracheal noise, focusing on respiratory syndromes, including pneumonia.

#### 2.4.4. Skin Fold Test

A skin fold test was used to assess dehydration severity caused by vomiting and diarrhea, which are common symptoms of FPV.

### 2.5. Clinical observations

The severity of FPV varied widely among cats, depending on factors such as age, immune status, and concurrent infections. Acute cases commonly presented with fever, depression, anorexia, vomiting, and diarrhea, often leading to dehydration and weakness. Severe cases resulted in mortality due to complications such as sepsis, dehydration, and disseminated intravascular coagulation (DIC) within 10 to 12 days post-infection.

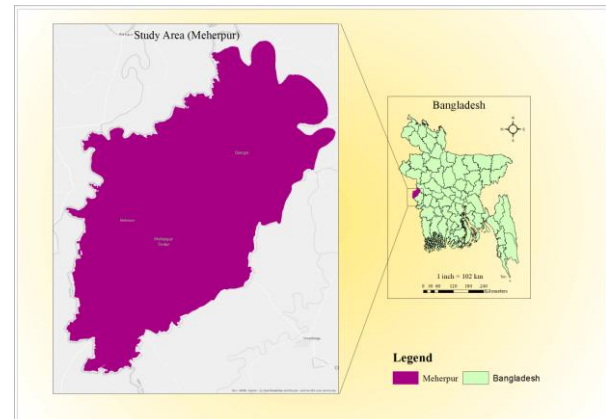
Neonates under six weeks old exhibited neurological signs, including ataxia, hypermetric movements, and blindness. Cerebellar dysfunction and progressive retinal degeneration were also noted in affected kittens.

### 2.6. Data analysis

The collected data were analyzed to determine the prevalence of FPL, associated risk factors, and treatment practices in Meherpur. Clinical findings were systematically reviewed to understand the

progression of the disease and assess the effectiveness of the prescribed treatments.

This study provided insights into the epidemiology, clinical presentation, and treatment of FPL in Meherpur, highlighting the need for improved veterinary services in the region.



**Figure 1:** Geographical location of Meherpur and study area

### 2.7. Determination of prevalence

The prevalence was recorded using the common formula:

Prevalence

(%)=

$$\frac{\text{No. of FPV affected cats at point of time}}{\text{No. of cats examined in the field at that point of time}} \times 100$$

(Hunt & Kaloshin, 2023)

Determination of prevalence 95% confidence interval

For calculating the 95% confidence interval using the common formula:

$$CI = \hat{p} \pm Z \times \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}$$

$\hat{p}$  is the sample proportion (prevalence).

Z is the Z-score associated with the confidence level (e.g., for 95% confidence,  $Z=1.96$ ).

n is the total sample size. (How To Calculate Confidence Interval in Excel and Google Sheets, n.d.)

### 2.8. Statistical analysis

After data collection, the data were cleaned and entered into Microsoft Excel 2021. The prevalence and its 95% confidence interval were

then determined using the same excel file by manually inputting the formulas.

### 3. Results

A total of 133 clinically affected cats were examined, with Feline Panleukopenia Virus (FPV) being the most prevalent disease identified. The associations between FPV prevalence and various factors are described below, based on the summarized table in the document.

#### 3.1. Disease prevalence

FPV accounted for the majority of cases, affecting 52.6% of the cats examined. Other notable diseases included respiratory infections (13.5%), parasitic infestations (12.8%), gastrointestinal issues (8.3%), skin and coat disorders (7.5%), and miscellaneous conditions (5.3%). The high prevalence of FPV underscores its role as a major health concern in the cat population (Table 1).

#### 3.2. Factors Associated with FPV Prevalence

##### 3.2.1. Monthly distribution

The prevalence of FPV varied across the months studied, with February having the highest prevalence (28.57%), followed by January and March (18.57% each), and April (17.14%). This indicates a potential seasonal influence on FPV occurrence (Table 2).

##### 3.2.2. Breed

FPV was more prevalent in Persian cats (60%) compared to Golden cats (40%), suggesting breed-specific susceptibility (Table 2).

##### 3.2.3. Age Group

Kittens ( $\leq 4$  months) were the most affected (42.86%), followed by young cats (5–12 months, 38.57%) and adults ( $\geq 12$  months, 18.57%). This highlights the vulnerability of younger cats to FPV infection (Table 2).

##### 3.2.4. Sex:

Female cats had a significantly higher prevalence (67.14%) compared to males (32.86%), indicating possible sex-based differences in susceptibility or exposure (Table 2).

#### 3.2.5. Living conditions

Cats living both indoors and outdoors had the highest prevalence of FPV (52.86%), compared to those living indoors only (25.71%) or outdoors only (21.43%). This suggests that mixed living conditions may increase exposure to infection sources (Table 2).

#### 3.2.6. Contact with other cats

FPV was significantly more prevalent in cats with regular contact with other cats (77.14%) compared to those without such contact (22.86%), emphasizing the role of cat-to-cat transmission (Table 2).

#### 3.2.7. Vaccination status

Non-vaccinated cats had a much higher prevalence (85.71%) compared to vaccinated cats (14.29%). This finding highlights the critical importance of vaccination in preventing FPV (Table 2).

#### 3.2.8. First treatment provider

Most cases were initially treated by veterinarians (58.57%), followed by quacks (34.29%), and self-treatment by owners (7.14%). This reflects variability in healthcare-seeking behavior among cat owners.

Treatment Medication: Ceftriaxone (I/M) was the most commonly used medication (84.29%), followed by Amoxicillin (I/M), Penicillin and Streptomycin, Ciprofloxacin, and Ceftiofur.

Vomiting was the most common symptom (94.29%), while diarrhea was reported in 17.14% of cases. Only 2.86% of cats had a history of prior FPV infection, indicating that reinfections are rare. Ceftriaxone (I/M) was the most commonly prescribed treatment (84.29%), followed by Amoxicillin (7.14%), Penicillin-Streptomycin combinations (4.29%), Ciprofloxacin (2.86%), and Ceftiofur (1.43%) (Table 2).

The study highlights FPV as the leading health concern among cats in the study population, with significant associations with age, sex, breed, vaccination status, and living conditions. The findings underscore the importance of vaccination, improved management of living conditions, and timely veterinary care to reduce

FPV prevalence and improve feline health outcomes (Table 2).

**Table 1:** Summary of disease prevalence

Disease	No. of Cases	Prevalence (%)	95% Confidence Interval (%)
Feline panleukopenia (FPV)	70	52.6	44.15–61.12
Respiratory infections	18	13.5	7.72–19.35
Parasitic infestations	17	12.8	7.11–18.46
Gastrointestinal issues	11	8.3	3.59–12.95
Skin and coat disorders	10	7.5	3.04–12.00
Other diseases (miscellaneous)	7	5.3	1.47–9.06

**Table 2:** Factors Associated with FPV Prevalence

Factor	Categories	FPV Cases	Prevalence (%)	95% Confidence Interval (%)
Month	January	13	18.57	9.46- 27.68
	February	20	28.57	17.99- 39.15
	March	13	18.57	9.46- 27.68
	April	12	17.14	8.31- 25.97
Breed	Persian cats	42	60.00	48.52–71.48
	Golden cats	28	40.00	28.52–51.48
Age Group	Kittens ( $\leq 4$ months)	30	42.86	31.26–54.45
	Young (5–12 months)	27	38.57	27.17–49.97
	Adults ( $\geq 12$ months)	13	18.57	9.46–27.68
Sex	Female	47	67.14	56.14–78.15
	Male	23	32.86	21.85–43.86
Household Exposure	Yes	19	27.14	16.73- 37.56
	No	51	72.86	62.44- 83.27
Prior Infection in Same Cat	Yes	2	2.86	0.00- 6.76
	No	67	95.71	90.97- 100.00
Living Conditions	Both indoor and outdoor	37	52.86	41.16–64.55
	Indoor only	18	25.71	15.48–35.95
	Outdoor only	15	21.43	11.82–31.04
Regular Contact with Other Cats	Yes	54	77.14	67.31- 86.98
	No	16	22.86	13.02- 32.69
Diarrheic Condition	Yes	12	17.14	8.31- 25.97
	No	58	82.86	74.03- 91.69
Vomiting Condition	Yes	66	94.29	88.85- 99.72
	No	4	5.71	0.28- 11.15
Vaccination Status	Non-vaccinated	60	85.71	77.52–93.91
	Vaccinated	10	14.29	6.09–22.48
Treatment Provider	Veterinarian	41	58.57	47.03–70.11
	Quack	24	34.29	23.17–45.41
	Owner	5	7.14	1.11–13.18
Treatment Medication	Ceftriaxone (I/M)	59	84.29	75.76- 92.81
	Amoxicillin (I/M)	5	7.14	1.11- 13.18
	Penicillin and Streptomycin	3	4.29	0.00- 9.03
	Ceftiofur	1	1.43	0.00- 4.21
	Ciprofloxacin	2	2.86	0.00- 6.76

#### 4. Discussion

This study evaluated the prevalence and distribution of Feline Panleukopenia Virus (FPV) in cats presenting with clinical signs of the disease

in Meherpur Sadar Upazila, Bangladesh. The overall prevalence of FPV in the study was estimated at 1.50%, which is notably lower compared to earlier studies conducted in Bangladesh by (Hossen et al., 2024), who reported a prevalence of 40.45% (Rahman et al., 2010) who found a prevalence of 17.39%. The lower prevalence in the present study may reflect greater awareness of vaccination among cat owners, as well as the seasonal timing of data collection during winter, when lower prevalence rates are expected (Jubaer et al., 2024; Kabir et al., 2023).

### Seasonal Trends

The highest frequency of FPV cases was observed in spring (52.63%), followed by winter (42.11%) and late autumn. These findings align with those of Jubaer et al. (2024) and Kabir et al. (2023), who also noted a seasonal trend with a higher prevalence in winter. The ability of FPV to survive for prolonged periods in cool, dry environments likely contributes to these seasonal patterns, as environmental conditions favor viral persistence and transmission (Chisty et al., 2020).

### Age and Gender Distribution

Younger cats, especially those under six months of age, were disproportionately affected, accounting for 42.11% of cases. This is consistent with previous studies by Chisty et al. (2020); Jubaer et al. (2024); Kabir et al. (2023); Rahman et al. (2010) which highlighted the vulnerability of younger cats due to their immature immune systems and lack of prior exposure to the virus. In terms of gender, male cats were more frequently affected (60.53%) than females (39.47%), a finding similar to that of Jubaer et al. (2024), who reported a male predominance in FPV cases (60.49%).

### Vaccination and Deworming Status

Vaccination played a pivotal role in reducing susceptibility to feline panleukopenia virus (FPV). In this study, 97.37% of the FPV-affected cats were unvaccinated, while only 2.63% had been vaccinated. This underscores the protective efficacy of vaccination, as demonstrated in prior studies by Hossen et al. (2024), who found a 42.27% vaccination efficacy, and Chisty et al. (2020) which reported a 26.7% efficacy. Deworming history also significantly influenced

susceptibility; cats without a deworming history had a higher infection rate (68.42%) compared to those that had been dewormed (31.58%). This finding is consistent with the hypothesis proposed by Chisty et al. (2020) that parasitic infections can suppress the immune response, increasing susceptibility to viral infections like FPV.

### Clinical Signs

The most commonly observed clinical signs in FPV-infected cats were vomiting (97.37%), anorexia (97.37%), and diarrhea (17.14%), as reported in previous studies (Truyen et al., 2009; Chisty et al., 2020). Mild to moderate dehydration was also frequently observed (89.47%). These symptoms are characteristic of FPV infection and are critical for clinical diagnosis.

### Treatment Practices

FPV treatment primarily included antibiotics, fluid therapy, proton pump inhibitors (PPIs), and antiemetics. Ceftriaxone was the most frequently used antibiotic (60.53%), followed by metronidazole (18.42%) and a combination of both (21.05%). These findings are consistent with evidence-based treatment guidelines (Hossen et al., 2024), which recommend broad-spectrum antibiotics to manage secondary bacterial infections. Dehydration was managed with fluid therapy, predominantly 5% dextrose saline (Hossen et al., 2024). In cases with vomiting, Ondansetron was administered as an antiemetic (84.21%), while Pantoprazole was the preferred PPI for managing gastritis in FPV-exposed cats (Hossen et al., 2024).

### Implications and Recommendations

This study provides valuable insights into the epidemiology, clinical features, and treatment practices for FPV in Meherpur Sadar Upazila. The findings emphasize the need for robust vaccination and deworming programs to prevent FPV infections. Rapid intervention and proper treatment protocols are critical for controlling the disease. Additionally, long-term follow-up studies are necessary to evaluate the effectiveness of national vaccination programs and understand the dynamics of FPV prevalence in Bangladesh.

This study highlights the importance of preventive measures, including vaccination and deworming, alongside early diagnosis and appropriate

treatment, in mitigating the burden of FPV in cats. Enhanced awareness among pet owners and strengthened veterinary services are essential for effective disease management and control.

## 5. Conclusion

Feline panleukopenia (FPV), a highly contagious viral disease (Kabir et al., 2023), continues to pose a significant threat to the feline population in Meherpur, Bangladesh. This study reported an overall prevalence of 22.41%, highlighting the persistent burden of FPV in the region. Younger cats, particularly those under six months of age, were found to be the most vulnerable, underscoring the importance of early preventive measures. The majority of cases were observed in non-vaccinated cats, emphasizing the critical role of vaccination in protecting against FPV. The findings highlight the urgent need for universal vaccination programs and improved husbandry practices to reduce FPV prevalence among both pet and feral cats.

Seasonal trends revealed that FPV was most prevalent during the spring and winter months, when environmental conditions favor the survival and transmission of the virus. Local breeds dominated the affected population in the study area, although Persian cats demonstrated a relatively higher prevalence among different cat breeds. Affected cats exhibited characteristic clinical symptoms, including vomiting, diarrhea, anorexia, and dehydration.

While ceftriaxone was the most commonly used antibiotic for treatment, the successful management of FPV cases required a combination of antimicrobial therapy, fluid therapy, and antiemetic medications. This study highlights the need for additional research to identify the most effective treatment protocols for managing FPV, particularly in cats presenting with severe clinical signs such as anorexia.

To combat FPV and its associated impacts, stringent vaccination programs, public awareness campaigns, and timely veterinary interventions are essential. Collaborative efforts between veterinary authorities, local communities, and cat owners are vital for preventing FPV infections and safeguarding feline health in Bangladesh. By implementing robust prevention and control measures, the burden of FPV can be significantly

reduced, improving the overall health and welfare of cats in the region.

## Data availability

Data will be made available on request.

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