

An overview on feline panleukopenia in cats at Teaching and Training Pet Hospital and Research Centre



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List of abbreviations

Abbreviation	Elaboration
FPV	Feline Panleukopenia Virus
CVASU	Chattogram Veterinary and Animal Sciences University
TTPHRC	Teaching and Training Pet Hospital and Research Centre
BCS	Body Condition Score
et al.	et alia (and others)
N	Number of cases
TLR	Toll-like receptors
FVM	Faculty of Veterinary Medicine
CI	Confidence Interval

Abstract

Feline panleukopenia (FPV) is a highly contagious viral disease of cats caused by the feline parvovirus that affects gastrointestinal, immune and nervous system. The present study was being conducted with aimed to estimate the prevalence and frequency of different factors in feline panleukopenia along with understanding the frequent clinical signs and therapeutic practices of the disease. The study was being carried out at Teaching and Training Pet Hospital and Research Centre (TTPHRC) through the period of July 2020 to June 2021. A total of 2537 cases of cat were extracted from the paper-based recording system in TTPHRC of which 38 cases were clinically diagnosed as feline panleukopenia. All data were being entered into MS excel 2007 and were being analyzed by STATA-14 software. The prevalence of FPV was being estimated as 1.50 % (95% CL1.09-2.05). FPV cases were most frequently found in local breeds of male young non-vaccinated domestic cats in spring and winter seasons. Anorectic condition, frequent vomiting, diarrhea, and different level of dehydration were the prominent clinical signs in FPV. Fluid therapy (5% dextrose saline and 0.9% saline), antiemetic (ondansetron), proton pump inhibitor (pantoprazole/esomeprazole), antibiotics (ceftriaxone or metronidazole and ceftriaxone) and multivitamins can be used as the supportive treatment for the disease. Vaccination in proper age is strongly suggestive to prevent the disease.

Keywords: Feline panleukopenia, Different factors, Clinical signs, Treatment.

Chapter 1: Introduction

Feline panleukopenia is a highly contagious and fatal viral disease affecting domestic and wild felids. It is also known as feline distemper that is actually misnomers because the virus is closely related to the canine parvovirus (Decaro et al., 2008). Feline panleukopenia-like viruses have been isolated from cats, raccoons, mink, and the arctic fox, and are genetically very similar and distinct from CPV-like viruses from dogs and raccoon dogs. Besides FPV, new antigenic variants of the original CPV (CPV-2a and CPV-2b) are also able to replicate and cause disease in cats (Truyen et al., 2009). The virus attacks the rapidly dividing blood cells in the body, primarily the cells in the intestinal tract, bone marrow and skin (Stuetzer and Hartmann, 2014). Anemia and a low level of circulating white blood cells may develop due to affecting of blood cells by the virus (Stuetzer and Hartmann, 2014).

The disease is clinically manifested by anorexia, severe depression, vomiting, dehydration, enteritis and diarrhea. The highest morbidity and mortality occurs in kittens up to 12 months of age. Mortality is 25–90% in acute panleukopenia and up to 100% in per-acute infections (Stuetzer and Hartmann, 2014)

Rapid diagnosis of FPV infection is very important for isolating infected cats and prevent secondary infections of susceptible cats. Diagnosis based on clinical history and signs is not definitive. The laboratory tests can be carried out only in specialized laboratories and takes more time for result. As a result, the immunochromatography assay is the most rapid field diagnostic method used in clinical practice because the test procedure is simple and can be performed by veterinarians as well as by owners (Mosallanejad et al., 2009). Evaluation of the diagnostic kits (immunochromatography assay) showed an overall relative sensitivity and specificity of 95.8 and 99.7%, respectively (Esfandiari and Klingeborn, 2000). In addition the comparative testing of 83 samples in Germany between the one-step test and an immune electron microscopy (IEM) agreed with 85.5% cases. The sensitivity and specificity reported were 83.9 and 88.9%, respectively (Esfandiari and Klingeborn, 2000).

There is no specific treatment as it is a viral disease. Some supportive and symptomatic treatment has been recommended like antibiotic to control the secondary bacterial infection, antiemetic, combating dehydration, restoring electrolyte imbalance and nutritional supplement etc. (Chandler et al., 2008; Truyen et al., 2009). As it is a highly fatal disease, vaccination should be done to prevent the disease. The commercially available vaccines for FPV virus include the modified live virus or an inactivated virus vaccine (Gaskell et al., 2006). Two injections, at 8–9 weeks of age and 3–4 weeks later, are recommended, and a first booster 1 year later (Truyen et al., 2009). Supportive therapy and good nursing significantly decrease mortality rates.

The prevalence of feline panleukopenia may vary in different study throughout the world. In Iran it was being recorded as 37% (Mosallanejad et al., 2009) whereas 22.4% was reported in Bangladesh (Islam et al., 2010). In Namibia 48% prevalence was found in a population of free-ranging Cheetahs which shared habitat with domestic cats known to harbor the FPV (Munson et al., 2004).

Domestic cats, young ages, immune suppressed cat, multi-cats in households, aggressive and male cats are highly susceptible for feline panleukopenia. FPV is most likely to occur in cats younger than 1 year of age. But it can occur in unvaccinated or improperly vaccinated cats of all ages. The median age of affected cats in one study was 4 months, and when disease occurred in vaccinated cats, it occurred only in cats that had not received a booster vaccine after 12 weeks of age. However, kitten deaths have been reported in households of fully vaccinated kittens, possibly because of exposure to large amounts of virus in the environment. Outbreaks of FPV in cats correlate seasonally with increases in susceptible newborn kitten numbers. FPV occurs most commonly in multicats-households, and especially in enclosed, shelter environments. It can also occur in cats with outdoor exposure, such as barn, feral, and stray cats (Kruse et al., 2010).

As it is a highly contagious and fatal disease for cat, the detail study regarding the disease is important to prevent and control the disease. As per our knowledge, very few studies especially based on treatment practices and vaccination status for feline panleukopenia in cats is scarcely documented in Bangladesh. Therefore, the present study was undertaken with the following objectives:

1. To estimate the prevalence of feline panleukopenia in cats.
2. To know the frequency of different factors like age, breed and sex etc. in feline panleukopenia.
3. To understand the frequently occurred clinical signs in the disease.
4. To get an idea about the therapeutic practices for the disease.

Chapter 2: Materials and methods

2.1 Study area:

Bangladesh's first-ever pet animal hospital, Teaching and Training Pet Hospital and Research Centre, which was started its journey on October, 2018 in Dhaka's Purbachal area. The hospital is regulated by Chattogram Veterinary and Animal Sciences University (CVASU). The hospital was set up for providing hands-on training to interns and postgraduate veterinary doctors. It has a well-equipped operation theater, x-ray, ultra-sonogram and laboratory facilities. It provides different services like treatment, vaccination, deworming, health check-up and surgery etc. to both pet animals and birds. Additionally, exotic and zoo animals are brought here for treatment and health checkup. So, it is a good source of different clinical cases of pet animals.

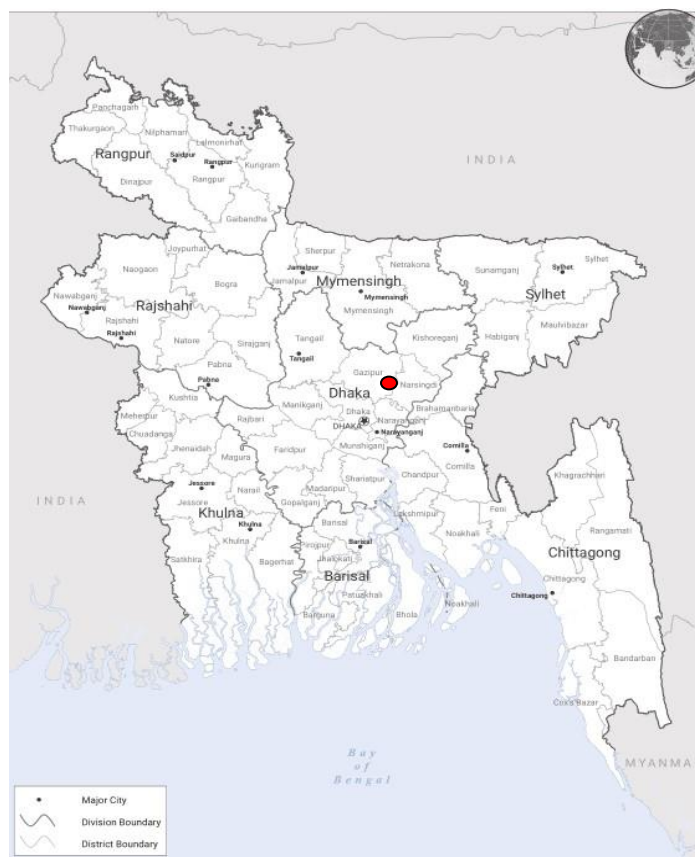


Figure 1: Study area ●

2.2 Study period and animals:

The study was being conducted based on hospital data record sheet from July 2020 to June 2021. A total of 2537 cases of cat were being extracted from the paper-based recording system in TTPHRC of which 38 cases were being diagnosed as feline panleukopenia by registered veterinarians or clinical faculty of TTPHRC.

2.3 Data and information collection:

After initial registration and history taking each case was being undergone for clinical examination. Clinico-epidemiological findings of each case were being recorded in the structured record keeping sheet. Data included address, date, total population, housing system, species, breed, age, sex, body weight, BCS, vaccination, de-worming, previous disease history with treatment, duration of illness, defecation, micturition and vomiting along with client demographic information (age, sex, education and job). Pulse, respiration, rectal temperature were being taken; skin fold test, examination of mucous membrane and different organs of the body were being performed by using the methods of palpation, percussion and auscultation. Diagnosis and drug prescription data were also being recorded in the structured record keeping sheet. Drug data made up with trade name of the drugs, main and supportive drugs, dose, route and duration.

2.4 Diagnostic approach:

Diagnosis of cases was being performed on the basis of the findings of clinico-epidemiological history, examination and rapid FPV diagnostic test kit. The cats that manifested frequent vomiting, anorexia, foul smelling diarrhea, depressed and severely weak were initially suspect for feline panleukopenia. Finally, it was being confirmed by rapid diagnostic test kit. In brief, the cat's feces or vomit sample was being collected by given sterile swab. After that, the swab sample was being placed into assay buffer tube and was being stirred thoroughly and being allowed for 2 minutes. Then cassette from the foil pouch was being opened and placed on a flat and clean surface. Later, a few samples were being collected in a dropper from the buffer-specimen mixture and were being added 3 drops of specimen to the hole of cassette from the dropper and timer was being started. After 5 minutes, result was being read. If the both control and test line was being shown, it would be considered as positive.



Figure 2: Positive result in FPV rapid diagnostic test kit

2.5 Statistical analysis:

All data obtained were being entered into Microsoft excel-2007, USA (MS excel 2007). Data were being cleaned, sorted and coded in MS excel 2007 before exporting to STATA-14 (Stata Corp, 4905, Lakeway Drive, College Station, Texas 77845, USA) for descriptive analysis. The proportionate prevalence of the disease was being calculated using number of identified cases divided by the total number of cases. Frequency distribution of cases (FPV) was being presented according to categories of each selected factors. 95% CI calculated by the modified Wald method using the Graph Pad software Quick Calcs.

Chapter 3: Results

The overall prevalence of feline panleukopenia in cats was being estimated as 1.50% (38/2537) (95% CI: 1.09-2.05).

3.1 Frequency distribution of different factors in feline panleukopenia in cats:

The distribution of FPV were higher in spring season (52.63%) followed by winter (42.11%) and late autumn (5.26%). Among breeds, local cats (68.42%) were mostly affected followed by Persian (18.42%), Cross (10.53%) and Siberian (2.63%) cats respectively. Age of the cats was stratified into 3 age categories. Majority of the cats belonged to less than 6 months aged group (42.11%) followed by 6-12 months (36.48%) and greater than 12 months (21.05%) respectively. Male cats (60.53%) were comparatively more affected than females (39.47%). About 95% affected cats were domestic and the rest were rescued (5.26%). The recorded data showed that more than 97% non-vaccinated cats were affected whereas only 2.63% in vaccinated cats. Cats with no deworming history were more susceptible (68.42%) than cats that were dewormed (31.58%) (Table 1).

Table 1: Frequency distribution of different factors in feline pan leukopenia in cats (N=38)

Explanatory factors	Co-factors	FPV n(%)	95% CL
Season	Late autumn	2(5.26)	0.54-18.20
	Spring	20(52.63)	37.26-67.52
	Winter	16(42.11)	27.84-57.82
Breed	Cross	4(10.53)	3.59-24.71
	Local	26(68.42)	52.45-81.01
	Persian	7(18.42)	8.91-33.73
	Siberian	1(2.63)	0.01-14.70
Age	<6 months	16(42.11)	27.84-57.82
	6-12 months	14(36.84)	23.34-52.76
	>12 months	8(21.05)	10.82-36.60
Sex	Female	15(39.47)	25.57-55.31
	Male	23(60.53)	44.69-74.43
Source of cat	Domestic	36(94.74)	81.80-99.46
	Rescued	2(5.26)	0.54-18.20
Vaccination	No	37(97.37)	85.30-99.99
	Yes	1(2.63)	0.01-14.70
Deworming	No	26(68.42)	52.45-81.01
	Yes	12(31.58)	18.99-47.55

3.2 Frequency distribution of observable clinical signs in feline panleukopenia in cats:

Vomiting (97.37%) and diarrhea (94.74%) were being found most frequent clinical signs in feline panleukopenia. Temperature was varied in affected cats where majority of the cats (76.32%) had normal temperature followed by fever (18.42%) and subnormal (5.26%) temperature respectively. Anorexia (97.37%) was found in almost all cases except few exceptions. Dehydration was categorized into normal, mild and moderate. Maximum of the cats showed mild dehydration (52.63%) followed by moderate (26.32%) and normal hydration status (21.05%) respectively (Table 2).

Table 2: Frequency distribution of observable clinical signs in feline panleukopenia in cats (N=38)

Clinical sign	Category	FPV n (%)	95% CL
Vomition	No	1(2.63)	0.01-14.70
	Yes	37(97.37)	85.30-99.99
Diarrhoea	No	2(5.26)	0.54-18.20
	Yes	36(94.74)	81.80-99.46
Temperature	Subnormal	2(5.26)	0.54-18.20
	Normal	29(76.32)	60.69-87.21
	Fever	7(18.42)	8.91-33.73
Feeding history	Normal	1(2.63)	0.01-14.70
	Anorectic	37(97.37)	85.30-99.99
Dehydration status	Normal	8(21.05)	10.82-36.60
	Mild	20(52.63)	37.26-67.52
	Moderate	10(26.32)	14.81-42.17

3.3 Frequency distribution of given treatment for feline panleukopenia in cats:

Antibiotics, fluid therapy, proton pump inhibitor, antiemetic, and multivitamins were mainly prescribed for feline panleukopenia in cats. Ceftriaxone (60.53%) was highly used antimicrobials followed by combined antimicrobials (ceftriaxone and metronidazole) (21.05%) and only metronidazole (18.42%) respectively. Most frequently used fluid therapy was 5% dextrose saline followed by normal saline (7.89%) to maintain fluid and electrolyte imbalance in the patients. Pantoprazole (78.95%) was chosen mostly over esomeprazole (2.63%) as proton pump inhibitor. Antiemetic (ondansetron) and multivitamins were used in 84.21% and 65.79% FPV cases respectively (Table 3).

Table 3: Frequency distribution of given treatment for feline panleukopenia in cats (N=38)

Treatment options	Name of drugs	FPV n(%)	95% CL
Antibiotics/antimicrobials	Ceftriaxone(C)	23(60.53)	44.69-74.43
	Metronidazole(M)	7(18.42)	8.91-33.73
	Combined(C+M)	8(21.05)	10.82-36.60
Fluid therapy	DNS5%	34(89.47)	75.29-96.41
	NS	3(7.89)	2.00-21.52
	None	1(2.63)	0.01-14.70
Proton pump inhibitor	Pantoprazole	30(78.95)	63.40-89.18
	Esomeprazole	1(2.63)	0.01-14.70
	None	7(18.42)	8.91-33.73
Antiemetic	Ondansetron	32(84.21)	69.20-92.94
	None	6(15.79)	7.06-30.80
Multivitamin	Aminovit plus vet	25(65.79)	49.83-78.85
	None	13((34.21)	21.15-50.17

Chapter 4: Discussion

Feline panleukopenia is one of the highly infectious and contagious diseases and often lethal for cats. The current study analyzed the prevalence of FPV, frequency of different factors in FPV, identified common clinical signs and drug prescription pattern of FPV in cats at TTPHRC in Bangladesh. This section of the report has been discussed findings of the current study and their implications in comparison to findings of the existing study in home and abroad.

It is an endemic disease in cats in Bangladesh, and a high level of FPV was expected (Stuetzer and Hartmann, 2014; Sultana et al., 2016). According to previous study, the prevalence of FPV in Bangladesh was reported as 22.4% (Islam et al., 2010) and 7.5% (Sultana et al., 2016) which was comparatively higher than the finding of the present study. It may be due to seasonal effects of study like Islam et al., (2010) done their study at spring season. Moreover pet owners are relatively more conscious about the vaccination of their pets that may reduce the possibility of infection.

FPV occurred most frequently in spring (52.63%) and winter seasons (42.11%) in this study. This findings a little bit supported to the study of Sultana et al., (2016) who had done there study at winter season and reported 20.2% FPV. FPV viruses survive better in colder, drier climates and therefore be able to infect more cats. This virus is extremely hardy in the environment and may survive several months (Truyen et al., 2009).

The present study showed young cats (42.11%) were mainly affected. This observations agreed with the report of Kruse et al., (2010) and Sultana et al., (2016) where recorded 25.71% and 56.7% FPV respectively in young cats. Young's were affected mainly due to less immunity and mostly remained non-vaccinated. On the other hand vaccination, recovered from infection and some other environmental factors influenced to older cats to acquire immunity against viruses that reduce the chance of infection (Scott and Geissinger, 1999).

Male (60.53%) cats were more affected than females (39.47%) which was very close to another study (59.5% males and 40.5% females) (Kruse et al., 2010). It may be due to the expression of TLR receptors is various, depending on sex, TLR3, 7, and 9 are more widely studied in females and TLR2 and TLR4 in males, which may affect the strength of TLR-dependent immune

responses. Macrophages from male mice produce higher TLR4- and TLR2-dependent Th1 responses in infection (Citarová and Mojžišová, 2020).

About 95% domesticated cats and 5% rescued cats were affected with FPV which was disagreed with the previous report where pointed 62.1% domesticated and 37.9% rescued cats were affected (Kruse et al., 2010). This may be occurred due to less presence of rescued cat at TTPHRC. But Chisty et al., (2020) reported all the affected cats were domesticated. Local breeds (68.42%) were more susceptible than others which were agreed with the study of Chisty et al., (2020). They showed 24.2% affected cats were local where 10.5% cats were exotic breeds. The cause behind it may be availability of large number of local cats in the study area.

Vaccinated cats (2.63%) had a lower prevalence of FPV than non-vaccinated (97.37%). Similar picture was found in a previous study where recorded vaccinated cats (5.1%) were less susceptible to FPV (Chisty et al., 2020). This may be due to vaccination that helps to develop protective immunity against FPV infection in cats (Gore et al., 2006; Scott and Geissinger, 1999).

Cats with no deworming history were more susceptible (68.42%) than cats that were dewormed (31.58%). It may be due to low level of immunity because parasites affects immunity level (Fekete and Kellems, 2007).

Anorectic condition, frequent vomiting, diarrhea, weakness, and different level of dehydration were the prominent clinical signs in FPV. These clinical signs are well-supported by other study findings (Truyen et al., 2009).

Diagnosis was done by observing clinical signs, rapid FPV kit test and lab tests. Tentative diagnosis was done by observing clinical signs. For confirmation, rapid FPV kit and lab tests are needed but it takes long time for lab tests. In previous study, diagnosis was mainly done based on clinical signs by Chisty et al., (2020) and Sultana et al., (2016), based on clinical signs and rapid diagnostic test kits by Islam et al., (2010) and based on clinical signs, test kits and lab tests by Truyen et al., (2009). Similarly, the disease was diagnosed based on clinical signs and rapid diagnostic test kit in this study.

In the current study, fluid therapy (5% dextrose saline and 0.9% saline), antiemetic (ondansetron), proton pump inhibitor (pantoprazole, esomeprazole), antibiotics (metronidazole

and ceftriaxone) and multivitamins was used as the supportive treatment for FPV which was very similar to previous report (Truyen et al., 2009) with few exception. Besides, they also suggested whole blood transfusion, antiviral therapy in hypoproteinaemic cats. Additionally, proton pump inhibitor was used in this study to reduce gastritis that was lined with a separate study (Daure et al., 2017).

Limitations

1. The study was conducted only on positive cases due to time limitations. Therefore frequency distribution of different factors of feline panleukopenia was estimated rather than risk factors.
2. Structured record keeping sheet from hospital-based recording system was used to obtain required data and information. So, there might have introduced some information bias in this study.

Conclusion and recommendations

The study was conducted at TTPHRC at Dhaka to obtain an idea about the prevalence of FPV among the cats in Dhaka city and its surrounding areas associated with frequency of different factors, clinical signs and treatment protocol of FPV in cats. FPV was highly found on local breeds of male young non-vaccinated domestic cats in spring and winter season. To prevent FPV in cats, it's better to vaccinate in proper time. Fluid therapy (5% dextrose saline and 0.9% saline), antiemetic (ondansetron), proton pump inhibitor (pantoprazole or esomeprazole), antibiotics (metronidazole and ceftriaxone or only ceftriaxone) and multivitamins preparation can be used as the supportive treatment for FPV in cats.

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Biography

The author, Md. Touhiduzzaman, son of Late Abdul Karim Gazi and Samnunnahar was born on March 6, 1997 at Tala, Satkhira. He passed Secondary School Certificate examination from Nagarghata Kabi Nazrul Bidyapith in 2013 followed by Higher Secondary Certificate examination from Kalaroa Govt. College in 2015. He is now enrolled in year-long internship programme for completion of Doctor of Veterinary Medicine (DVM) degree in CVASU, Chattogram, Bangladesh. He has immense interest to work as a veterinary practitioner.