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Full Length Research Paper

ANTIGENIC DETECTION OF FELINE PANLEUKOPENIA VIRUS IN LOCAL BREED CATS AT TANGAIL DISTRICT IN BANGLADESH

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ABSTRACT

Feline panleukopenia virus (FPV) is highly contagious viral disease of cat, responsible for high mortality but to our knowledge, there is not report for the antigenic detection of FPV in Bangladesh. Therefore, a cross-sectional survey was carried out for the antigenic detection of FPV in 58 randomly selected cats consisted of 46 pet and 12 stray cats at Tangail district in Bangladesh during May to October 2009. Rectal swab samples were collected from all cats and tested by commercial rapid RapiGEN® Feline Parvo Virus (FPV) Ag Test Kit (RapiGEN Inc., Korea) following the manufacturer's instructions. This study revealed that 22.41% of cats were found positive for FPV. The infection was more prevalent in cats less than 2 months (29.62%) compared with cats of age group 2 months to 1 year (21.43%) and age group > 1 year (11.76%) and higher prevalence of FPV was recorded in female (26.92%) than those of male (18.75 %) cats. A higher prevalence of FPV was recorded in stray cats (41.67%) than that of pet cats (17.39%) and in diarrhoeic cats (29.73%) than those of non-diarrhoeic cats (9.52%). There were no significant relationship with test results and variables. The knowledge of the status of feline panleukopenia infection in cats of study area would be helpful for initiating preventive measures.

Keywords: Prevalence, survey, pet cats, stray cats

INTRODUCTION

Feline panleukopenia, also known as feline distemper is a highly contagious viral disease of cats caused by a non-enveloped, single-stranded DNA virus and characterized by enteritis, leukopenia and developmental abnormalities (Clemens and Carlson, 1989). Feline panleukopenia virus (FPV) belongs to the feline parvovirus group of the Parvoviridae family together with canine parvovirus type 2 (CPV-2) and other parvovirus of carnivores (Greene, 1998) and is known to infect cats worldwide and other members of the felidae, as well as raccoons, mink and foxes (Steinel *et al.,* 2001). A feline ataxia syndrome has been described that results from an impaired development of the cerebellum due to lytic virus replication in Purkinje cells of the infected kitten (Kilham *et al.,* 1971). Fetal infection may induce a form of immunological tolerance so that kittens continue to shed virus for extended periods of time after birth (Pedersen, 1987).

FPV is highly resistant to physical factors and chemical substances and it may remains infectious for weeks or even months in contaminated environment (Uttenthal *et al.,* 1999). Feline panleukopenia virus is the most commonly transmitted by direct contact of susceptible animals with infected cats or their secretions. It is shed from all body secretions during the active stages of the disease but is most consistently recovered from the intestine and feces (Greene, 1998). The feline panleukopenia virus also remains infectious in the environment for months to years, and can be found in such places as cages, food bowls, litter boxes and in people and the death rates are high in young (3-5 months of age) cats and in susceptible cats (those with other illness, not vaccinated or living in high risk situations) (Richards *et al.,* 2006).

Feline panleukopenia can be diagnosed directly by isolating the virus from blood or feces in cultures of CRFK or Mya 1 cells (Miyazawa *et al.,* 1999) and by the demonstration of haemagglutination of porcine erythrocytes (Goto, 1975). Antibodies to FPV can also be detected by ELISA (Fiscus *et al.,* 1985) or indirect immunofluorescence (Hofmann-Lehmann *et al.,* 1996). But the use of an antibody test is of limited value, because serological tests do not differentiate between infection and vaccination-induced antibodies (Fiscus *et al.,* 1985). However, these methods are now rarely used for routine diagnosis. In practice, FPV antigen detection in feces is usually carried out using commercially available latex agglutination or immunochromatographic tests (Addie *et al.,* 1998).

Rapid diagnosis of FPV infection is especially important in order to isolate infected cats and prevent secondary infections of susceptible animals. Since clinical diagnosis is not definitive, besides laboratory techniques can be carried out only in specialized laboratories and takes more time for conclusion, whereas 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). Furthermore, 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).

Although few information on prevalence of FPV are available elsewhere (Addie *et al.*, 1998; Cave *et al.*, 2002) but published literature on prevalence of feline panleukopenia in Bangladesh is scarce. Therefore the present research was undertaken with an aim to determine the prevalence of FPV in companion cats and stray cat at Tangail district in Bangladesh.

MATERIALS AND METHODS

Study area, period and animal

A cross-sectional study was conducted on a total of 48 cats ranged between 2 and 14 months of age consisting of 46 pet cats and 12 stray cats from seven villages of Tangail district in Bangladesh during the period from April to September 2009. The pet cats were kept indoor and looked after by the owners not go outside whereas stray cats were wondering at forest, bush and road side as well as homestead area for searching their food. The body weight of the cats ranged between 0.4 kg and 1.6 kg. None of the cats had any history of vaccination against feline parvo virus infection.

Test kit

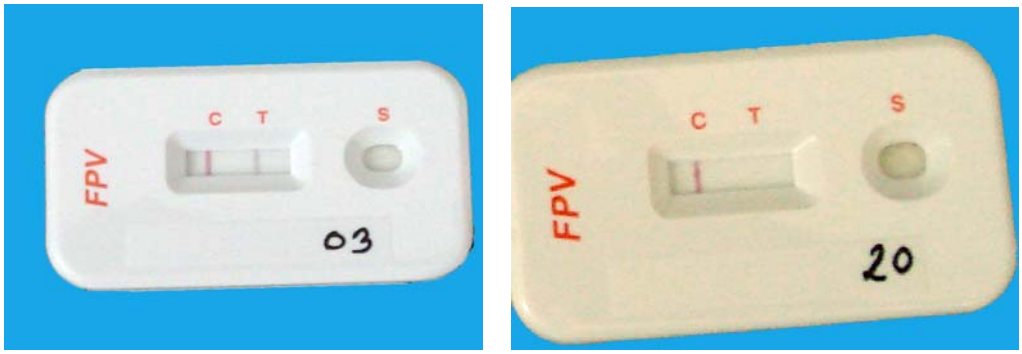
The test was carried out with a commercial rapid RapiGEN® Feline Parvo Virus (FPV) Ag Test Kit (RapiGEN Inc., Korea) following the manufacturer's instructions. This kit is a chromatographic immunoassay for the qualitative detection of panleukopenia antigen in feline feces. The detection limit of this kit is about 104.5 TCID50/0.1 ml (Esfandiari and Klingeborn, 2000).

Collection of samples

Stray cats were restraint by trapping and pet cats by the owner for easy sampling. Rectal swabs were collected by using sterile cotton swab provided with kit and kept in top-off extraction bottles containing assay buffer and mixed properly. The extraction bottles were then transferred to the laboratory using ice-box and kept at 2-4ºC until tested.

Test procedure

The tests were performed within one week of sampling within 7 days of sample collection in the laboratory at Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh following the manufacturer's instructions. Before testing, the extraction bottle were kept at room temperature for a short time and about four drops of supernatant were poured into the sample well (S) by squeezing the buffer bottles. As the test began to work, a purple colour band was observed moving across the result window in the center of the test device. Interpretations of test results were also performed within 4-5 minutes (not after 10 minutes). The appearance of only one band (control band, C) within the result window indicated a negative result while appearance of two bands (test band, T and control band, C) within the result window, no matter which band appeared first, indicated a positive result. If the control band (C) was not visible within the result window after performing the test, the result was considered invalid (Esfandiari and Klingeborn, 2000).



A B

Fig A. Result window of test kit showing two colour bands (C and T) indicating Feline Panleukopenia Virus (FPV) positive result (sample no. 03) and Fig B. showing only one colour band (C) indicating Feline Panleukopenia Virus (FPV) negative result (sample no. 20).

Statistical analysis

Potential association of the test results with age, sex, rearing systems were performed by SPSS 11.5 (2002) for windows using chi-square analysis were a p-value of $P < 0.05$ was considered significant.

RESULTS AND DISCUSSION

Of 58 cats studied, 13 (22.41%) were affected with FPV (Table 1). The infection was more prevalent in cats less than 2 months (29.62%) compared with cats of age group 2 months to 1 year (21.43%) and age group > 1 year (11.76%) and a higher prevalence of FPV was recorded in female (26.92%) than those of male (18.75 %) cats. Higher prevalence of FPV was

recorded in stray cats (41.67%) than that of pet cats (17.39%) and in diarrhoeic cats (29.73%) than those of non-diarrhoeic cats (9.52%). There were no significant relationship with test results and animal level variables.

Table 1. Results of rapid test kit for detection of FPV in relation to age, sex, health condition and type of cats

Variables	Category level	No. of sample tested	Test Results		Level of significance (p- value)
			Positive No.	Prevalence (%)	
Age	less than 2 months	27	8	29.62%	0.382
	2 months to 1 year	14	3	21.43%	
	> 1 year	17	2	11.76%	
	Sub total	58	13	22.41%	
Sex	Male	32	6	18.75 %	0.485
	Female	26	7	26.92%	
	Sub total	58	13	22.41%	
Health condition	Diarrhoeic cat	37	11	29.73%	0.076
	Non-diarrhoeic cat	21	2	9.52%	
	Sub total	58	13	22.41%	
Type	Pet (owned)cats	46	8	17.39%	0.073
	Stray (free roaming) cats	12	5	41.67%	
	Sub total	58	13	22.41%	

Legends: %= percent

This study revealed that 22.41% of cats of different villages at Tangail district in Bangladesh were affected with the FPV. The studied cats had no history of vaccination against FPV and it is obvious that vaccination can play a major role to protect animals from infectious diseases. Stray cats can play a major role in transmitting the disease to other cats. Meanwhile, the virus is extremely stable and resistant to adverse environmental influences. The prevalence of FPV infection varies in different geographic areas. Blood samples were analyzed from 30 domestic cats from the Petén region of Guatemala to determine the seroprevalence of FPV. Fifty percent (15 of 30) of the cats sampled were seropositive for feline panleukopenia (Lickey *et al*., 2005).

A sero-survey of feline panleukopenia (FPV) in cats from Ho Chi Minh City area in southern Vietnam was conducted and the results compared with their previous results in northern Vietnam. The seropositivity of FPV (44%) was similar to that in Hanoi area (Nakamura *et al*., 1999). The prevalence of antibodies to feline parvovirus (FPV) in 51 European sera was 2%. Samples were collected between 1996 and 1997 from cat populations in France, Switzerland, and Germany. Due to the low prevalence of FPV infections and on the basis of the fact that the European cats live solitarily, it is concluded that this viral infection does not spread readily within a population (Leutenegger *et al*., 1999).

Serum samples from leopard cats in Taiwan and Vietnam were examined for the prevalence of antibodies against feline parvovirus in which nine of the 11 leopard cats were shown to have antibodies against feline parvovirus (Ikeda *et al*., 1999). Serological tests were also used to determine the prevalence of infection among 300 adult feral cats in three different habitat types in south-eastern Australia and a high prevalence of specific antibody to feline panleukopaenia virus (79%) was observed (Berns *et al*., 2000).

Over a period from 1973 to 1979, a serological survey of virus infection was conducted on feline sera collected in four universities located in different prefectures in Japan. A significant hemagglutination-inhibition (HI) antibody titer of 1:8 or higher to feline panleukopenia virus (FPV) was detected in 130 (58%) sera out of the 226 sera used (Goto *et al*., 1981). Feline panleukopenia is one of the most common causes of infectious diarrhoea in cats younger than 6 months. Kittens between 3 and 5 months of age are at high risk for FPV (Greene, 1998). The present study showed that the prevalence of infection was greater in cats less than 6 months of age, although the difference was not significant between age groups ($p>0.05$). Infection was not observed in cats older than 1.5 year; further investigations need to be why that occurred.

Isolation and treatment of the affected cats is very important, particularly in the first week of the disease, in order to the prevention of disease transmission to healthy cats. High mortality in FPV may be due to secondary bacterial infections with enteric microflora (Greene, 1998). Gram-negative endotoxemia, with or without bacteremia are common complications of systemic FPV infection. In may be concluded that vaccination against panleukopenia and hygienic procedures are important measures for the prevention of FPV infections in the companion cat population, as FPV is a very stable virus (Greene, 1998).

CONCLUSION

This study for the first time revealed that 22.41% of cats at different villages at Tangail district in Bangladesh were affected with the FPV. The knowledge of the status of FPV in affected cats of the study area will contribute to the livestock disease related epidemiological database of Bangladesh and would be helpful for initiating preventive measures. Further epidemiological and biological studies are needed for controlling parvovirus diseases in stray and domestic cats as stray cats can play a major role in transmitting the disease to pet cats.

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