Prevalence of Feline Leukemia Virus Infection in Cats in Bangladesh

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Abstract : Feline leukemia virus (FeLV) is a retrovirus that represents one of the most common and important infectious diseases of cats worldwide and it is responsible for more deaths among cats than any other infectious diseases. Prevalence data are necessary to define prophylactic, management and therapeutic measures for stray, feral and owned cats which are lacking in Bangladesh. The study was carried out to determine the prevalence of FeLV infection in Mymensingh district of Bangladesh using RapiGEN® FeLV Ag Test Kit (RapiGEN® Inc., Republic of Korea), a rapid one-step immunochromatographic assay. Blood samples from total 130 cats (23 owned cats and 107 unowned cats) were collected and tested following the manufacturer's instruction. An overall prevalence of FeLV infection was 1.54% (2/130). Prevalence was found 1.79% (2/112) on Day 0-up to one year aged cats (young) but no positive case was found in above 1 year (Adult) aged group. In male and female cats, the prevalence was 1.72% (1/58) and 1.39% (1/72), respectively. In un-owned cats the prevalence was 1.87%. Positive cases to FeLV were found only in clinically sick cats. No significant relationship was found according to age, sex, ownership status and health status. To the best of our knowledge this is the first report of the prevalence of FeLV infection in Bangladesh using RapiGEN® FeLV test kits which is very much effective because it is easy to apply, less expensive and quick screening of such type of infection.

Key words : Feline leukemia virus (FELV), RapiGEN® Kit, rapid one-step immunochromatographic assay, Bangladesh.

Introduction

Feline leukemia virus (FeLV) is a retrovirus that represent one of the most common and important infectious diseases of cats worldwide (6). The cat has been living in close association with humans for at least 3,500 years, the history of domestic cat may stretch back even further, as 8,000 year-old bone of humans and cats were found buried together on the island of Cyprus. The cat is the world's most popular household pet. Although the FeLV is related to human immunosuppressive (1) disease, the risk of zoonosis among healthy adult humans appears to be extremely small. However, potential for retroviral zoonosis especially for viruses such as FeLV that can replicate in human cells cannot be eliminated and universal precautions to reduce potential exposures should be used when handling sick cats (3). Recently, comprehensive data on the seroprevalence of retrovirus infections of cats have become available and are reviewed. Little *et al.* (8) determined the seroprevalence (3.4%) of FeLV in 11144 cats in 10 Canadian provinces and he found that factors such as age, gender, health status and lifestyle were significantly associ-

ated with risk of FeLV infection. Danner *et al.* (4) showed that FeLV infection is responsible for more death among cats than any other and determined the prevalence 16.2% (11 of 68) to FeLV antigen in feral cats (*Felis catus*) on Mauna Kea Hawaii from April 2002 to May 2004. Park *et al.* (12) found 1.1% seroprevalence of Feline Leukaemia Virus (FeLV) infections among 10 out of 875 cats from 4 major cities and 4 provinces in Republic of Korea between March and October 2004. They also found that the positive rate for FeLV infection were 3.8% in sick cats and 0.6% in healthy cats. The cats at the age of more than 1 year showed higher incidence rate than younger ones. Blanco *et al.* (2) detected 16.7% seroprevalence of FeLV infections in 96 domestic cats of Costa Rica's greater metropolitan area from June 1998 to December 2001. Out of 17, 11 (64.7%) positive cats were older than 1 year at the time of testing. No significant differences were found between the percentage of seropositive males and females. Little (9) showed 4% positive reaction for Feline Leukaemia Virus (FeLV) antigen in 246 cats in North America. Of the 246 cats tested, 161 were male (65%) and 85 were female (35%). Rypua *et al.* (13) found 7.5% serogically-positive FeLV in 550 cats in Wroclaw city, Poland.

Kucer *et al.* (7) found 11.5% FeLV positive reactors among 61 healthy cats and 14.9% FeLV positive reactors among 87

clinically ill cats in Croatia. Maruyama *et al.* (10) found 2.9% (32/1088) seroprevalence of FeLV infections in 1447 domestic cats derived from the north (Hokkaido) to the south (Okinawa) prefectures in Japan. Ferreiro *et al.* (5) collected blood from 150 cats in the metropolitan area of Porto Alegre, Brazil and found that 24.7% cats were FeLV-seropositives. Ostrowski *et al.* (11) found 3%, 8% and 0% for FeLV serologic prevalence in wild cats, sand cats and feral domestic cats, respectively in central west Saudi Arabia between May 1998 and April 2000. Prevalence data are necessary to define prophylactic, management and therapeutic measures for stray, feral and owned cats and a comparatively less expensive but rapid and confirmatory test for detection of viruses is crucial for adaptation of effective control of the disease in the developing country like Bangladesh. Although information on prevalence of feline viral diseases is available elsewhere in the world but to the best of our knowledge there are no reports on FeLV in cats in Bangladesh.

Considering the above facts in the field of viral disease diagnosis particularly for FeLV in the cat population of Bangladesh, present research work was undertaken to find out the prevalence of FeLV infection among cats using RapiGen® FeLV Ag test in Sadar upazilla of Mymensingh district of Bangladesh.

Materials and Methods

The study was conducted during the period of 6 months from 1st October 2011 to 31st March 2012 in the Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. A total of 130 samples from cats were collected randomly from Sadar Upazilla of Mymensingh district of Bangladesh and Questionnaire based data on age, sex, ownership status and health status of cats were recorded. Among them, male cats were 58 and female cats72; owned cats 23 and unowned cats 107; under one year of aged cats were 122 and above 1 year of aged cats were 18; apparently healthy cats were 108 whereas sick cats (dull, depressed, underweight and malnourished) were 22.

Blood and Sera Collection

Cats are captured randomly by using trap with gunny bag. In case of owned cats, they were restrained by owner. Then the cats were taken into a squeeze cage for restraining. General anesthesia was done with intramuscular injection of Ketamine 25 mg/kg body weight. Blood is collected directly from heart through 4th-6th intercostals space by using 3 ml syringe with 22 gauge needle. Sometimes serum was collected from the blood where kits were not carried out. Blood sample were kept undisturbed to facilate clotting. Serum was collected after few hours of blood collection.

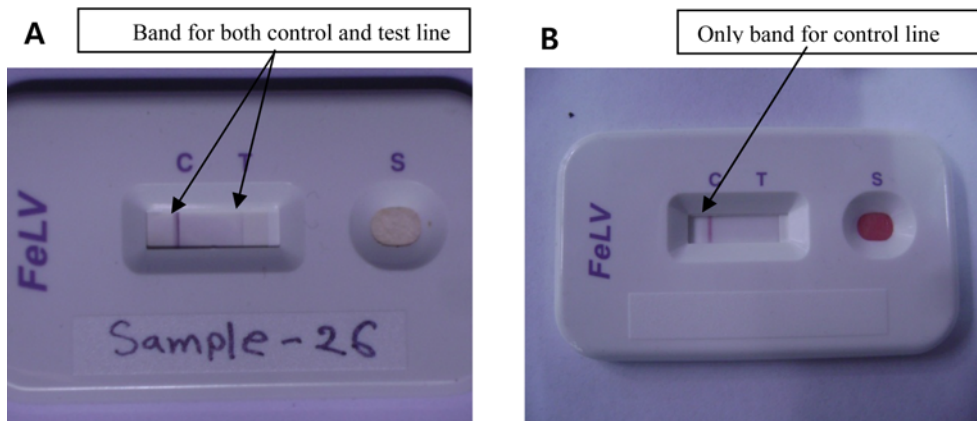### Feline leukemia virus (FeLV) Ag test kit

Test was performed using RapiGEN FeLV Ag test kit as per manufacturer's instruction. At first, the test device was removed from its sealed pouch by tearing along the notch. One drop of whole blood or serum (plasma) was dispensed into the sample well (S) and 3 drops of buffer were added. After 5~10 minutes, result was read.

Interpretation of the results

If two red/purple bands were appeared, one in the control line(C) and the other in the test line (T), the sample was considered positive for the presence of FeLV (Fig 1A). If one red/purple band was appeared in the control line(C) with no apparent band in the test line (T), the sample was considered negative for FeLV (Fig 1B). If no red/purple band appeared in the control line(C), or if a band appeared in the test line (T) but not in the control line(C), then the test was considered invalid.

Data processing and statistical analysis

The data was entered in Microsoft Excel 2007 and transferred to R.14.2 (The R foundation for Statistical Computing, Vienna, Austria) for descriptive and analytical statistics. Bivariable logistic regression method in R was used to determine associations among age, sex, ownership status and health status of cat with FeLV infection.

Fig 1. Double band (A) and single band (B) test results of the sample indicating feline leukemia virus (FeLV) infection positive and negative, respectively.

Results

Out of total 130 cats tested, 2 cats were found to be positive to FeLV infection. Therefore, overall prevalence of FeLV infection was 1.54% in Sadar Upazilla of Mymensingh district of Bangladesh (Table 1).

In this study 2 positive cases were found from total 112 cats on Day 0-up to one year of age (young) but no positive cases were found in 18 cats above 1 year (Adult) of age. So, the prevalence was 1.79% on Day 0-up to one year aged cats (Table 2). Out of 58 male cats, 1 cat showed positive reaction and out of 72 female cats, 1 cat showed positive reaction to FeLV infection. The prevalence in male is 1.72% and in female is 1.39%. The prevalence is more in male compared with female but the relationship is not significant (P > 0.05) (Table 2). 2 positive cases were found in 22 sick cats but no positive cases were found in 108 apparently healthy cats but the prevalence was 9.09% in sick cats in Sadar Upazilla of Mymensingh district of Bangladesh (Table 2).

In 107 unowned cats, 2 positive cases were found and the prevalence was 1.87% whereas in 23 owned cats, no positive cases were found (Table 2).

Discussion

Seroprevalence of FeLV infection were investigated in many countries like USA, Canada, Poland, Croatia, Costa Rica, Republic of Korea, Saudi Arabia, Japan, Brazil etc. In Bangladesh, no positive cases of FeLV infection were reported yet. In this study, overall prevalence of FeLV infection was 1.54% in Sadar Upazilla of Mymensingh district of Bangladesh (Table 1).

This finding is similar to the finding of Park *et al.* (12) who reported 1.1% seroprevalence from Republic of Korea. But the present finding is lower than the finding of Danner *et al.* (4) who reported 16.2% seroprevalence of FeLV infection. This may be due to different study period or different sample size. This finding is also lower than the prevalence of that recorded by Little *et al.* (8), Ferreiro *et al.* (5). The prevalence was 1.79% on Day 0-up to one year aged cats but no positive cases were found in 18 cats above 1 year (Adult) of age. This may be due to relatively less immunity of young cats. This finding is not similar with the findings of Blanco *et al.* (2) who reported 11 positive cats out of 17 (64.7%) in older than 1 year of age at the time of testing and also with the finding of Park *et al.* (12). The prevalence is more in male (1.72%) compared with female (1.39%) but the relationship is not significant. The finding is also similar to the findings of Little (9), Blanco *et al.* (2) and Park *et al.* (12). The prevalence was 9.09% in sick cats but no positive cases were found in apparently healthy cats in Sadar Upazilla of Mymensingh district of Bangladesh.

The finding is higher than the findings of Park *et al.* (12) who reported 3.8% prevalence in sick cats and 0.6% in healthy cats in Republic of Korea. The finding is lower than the finding of Kucer *et al.* (7) who reported 14.9% prevalence in sick cats and 11.5% in healthy cats in Croatia. In sick cats prevalence is more. This is may be due to immunodeficiency in sick animals. The prevalence was 1.87% in unowned cats whereas in owned cats, no positive cases were found. This is may be due to less hygienic care in unowned cats. Besides, owned cats do not need to move more for food which decreased the chance of infection.

The study indicates that FeLV infections are present in Bangladesh and the prevalence of FeLV infection is close to

Table 1. Overall prevalence of FeLV infection in cats in Sadar Upazilla of Mymensingh district of Bangladesh

Total No. of cats	No. of positive cases	No. of negative cases	Prevalence (%)
130	2	128	1.54

Table 2. Prevalence of feline leukemia virus (FeLV) infection in cats in Sadar Upazilla of Mymensingh district of Bangladesh according to the factors related to cats

Factors	No. of sample tested	No. of positive reactors	Prevalence (%)	Level of significance
Age				
Day 0-up to one year	112	2	1.79	NS
Above 1year (Adult)	18	0	0	
Sex				
Male	58	1	1.72	NS
Female	72	1	1.39	
Ownership status				
Owned	23		0	NS
Un-owned	107	2	1.87	
Health status				
Apparently healthy	108	0	0	NS
Sick	22	2	9.09	

NS = Not significant (p value > 0.05)

the prevalence of FeLV infections in other countries. Rapi-GEN FeLV test kits is very much effective because it is easy to apply, less expensive and quick screening of such type of infection can be done in developing country like Bangldesh. Increased awareness about seroprevalence data of FeLV infections among veterinarians, animal shelters, rescue organizations and pet owners may help to improve testing and vaccination rates. More extensive study is needed with larger sample size and broader area of coverage in Bangladesh to get more accurate result.

Acknowledgements

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방글라데시의 고양이 백혈병 바이러스의 감염율 조사

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요 약 : 고양이 백혈병 바이러스(feline leukemia virus, FeLV)는 전 세계적으로 고양이의 가장 일반적이고 중요한 전염성 질환 중 하나이며, 다른 어떤 전염병 보다 고양이에 폐사를 일으키는 중요한 전염병이다. 방글라데시에 있어서 이 질병의 이환율은 집에서 기르는 고양이나 집을 나간 야생 고양이에 대한 예방, 관리, 치료 방침을 정하는데 중요한 자료를 제시할 것이다. 이 연구는 신속 면역크로마토그라피 분석법을 이용한 RapiGEN® FeLV 항원검사 키트(RapiGEN® Inc., 대한민국)를 사용하여 방글라데시 Mymensingh 지역의 FeLV의 감염률을 조사하기 위해 수행되었다. 총 130마리 고양이(23마리 집에서 기르는 고양이와 107마리의 집을 나간 야생 고양이)의 혈액 샘플은 제조 업체의 사용법에 따라 수집 및 검사를 수행하였다. FeLV 감염의 전체 유병률은 1.54%(2마리/130마리)이었으며, 감염률은 1세 미만의 고양이에서는 1.79%(2마리/112마리)로 나타났으며, 1세 이상의 고양이에서는 모두 음성이었다. 수컷과 암컷의 감염률은 각각 1.72%(1마리/58마리), 1.39%(1마리/72마리)로 나타났다. 집에서 기르는 고양이에 있어서는 모두 음성이었으나 집을 나간 야생 고양이에 있어서 감염률은 1.87%로 나타났다. FeLV 양성은 모두 임상증상이 나타나는 고양이에서 발견되었다. 이 연구결과에 있어서는 성별, 소유 및 건강 상태에 따라 유의한 상관관계가 있는 것은 아니었다. 이 연구결과는 방글라데시에서 FeLV 감염률에 대한 처음 보고이며, 이 검사 방법에 사용한 신속 면역크로마토그라피 분석법을 활용한 항원검사 키트는 저렴하고, 빠른 검사로 결과를 얻을 수 있는 장점이 있어서 임상에 적용하기에 효과적인 것으로 판단된다.

주요어 : 고양이백혈병바이러스, 레피젠 키트, 신속 면역크로마토그라피 분석법, 방글라데시