



**Epidemiology of feline immunodeficiency virus and feline leukemia virus in a
veterinary teaching hospital**

*Epidemiologia do vírus da imunodeficiência felina e do vírus da leucemia felina em um
hospital veterinário universitário*

**Viviane Rodolfo Barros¹, José Artur Brillhante Bezerra^{2*}, Mariana Silva Bochnakian³,
Valéria Veras de Paula⁴, Kilder Dantas Filgueira⁵**

Resumo: O vírus da imunodeficiência felina (FIV) e o vírus da leucemia felina (FeLV) são responsáveis por importantes doenças infectocontagiosas em felinos. Desta forma, o objetivo do presente estudo foi investigar a prevalência e os aspectos epidemiológicos das infecções por FIV e FeLV em um hospital veterinário universitário. Realizou-se um levantamento epidemiológico dos casos de infecção pelo FIV e FeLV, diagnosticados no serviço de clínica médica do Hospital Veterinário da Universidade Federal Rural do Semi-Árido - UFERSA (Mossoró, Rio Grande do Norte, Brasil), a partir da análise dos prontuários de felinos admitidos durante o período de outubro de 2011 a julho de 2016. As fichas dos animais positivos foram revisadas para colher os dados epidemiológicos de cada animal, estilo de vida, sinais clínicos e distúrbios associados, e instituição de terapia específica. Distribuíram-se os dados em frequências absolutas e percentuais. De um total de 1.752 gatos atendidos, apenas 159 animais (9,07%) foram submetidos ao teste para FIV e FeLV. Trinta e nove felinos (24%) tiveram resultado reagente para FIV e apenas um gato (0,6%) foi reagente para FeLV, o qual também estava coinfestado com o FIV. A população FIV positivo estudada foi caracterizada por ser composta, em sua maioria, por machos, sem raça definida, acima de seis anos de idade e com acesso livre à rua. 90% desses animais estavam apresentando algum sintoma ou distúrbio clínico associado a essa retrovírose. A terapia específica para o FIV foi instituída em apenas um animal avaliado (2,56%). Os resultados do presente trabalho caracterizaram o perfil epidemiológico dos gatos acometidos pelo FIV na cidade de Mossoró. Ressalta-se que esse conhecimento é de fundamental importância para que o clínico seja capaz de diagnosticar, manejar e atuar na prevenção de tal enfermidade.

Palavras-chave: retrovírus, FIV, FeLV, estudo retrospectivo, *Felis catus*

Abstract: The feline immunodeficiency virus (FIV) and the feline leukemia virus (FeLV) are responsible for important feline infectious contagious diseases. Thus, the aim to the present study was to investigate the prevalence and the epidemiological aspects of FIV and FeLV infection in a teaching veterinary hospital. An epidemiological study was performed using the cases of FIV and FeLV diagnosed by the small animal medicine department of the Veterinary Teaching Hospital from Universidade Federal Rural do Semi-Árido (UFERSA, Mossoró, Rio Grande do Norte, Brazil), from the analysis of the medical records of the cats admitted between October 2011 and July 2016. The medical records of positive animals were reviewed to collect epidemiological data from each animal, lifestyle, associated clinical signs and clinical disorders, and specific therapy institution. Data were presented as absolute and percentage frequencies. From a total of 1,752 attended cats, only

159 (9.07%) were tested for FIV and FeLV. Thirty nine felines (24%) were reagent for FIV and one cat (0,6%) was reagent for FeLV, which was coinfecting by FIV. The FIV positive population was composed, in its majority, by males, crossbred, with age over than 6 years old and with outdoor access. 90% of these animals were presenting some symptom or clinical disorder related to this retrovirose. The specific therapy for FIV was instituted in only one animal studied (2.56%). Our results characterized the epidemiological profile of cats infected by FIV in Mossoró municipality. We emphasize that the epidemiological knowledge of feline viral immunodeficiency is very important for the clinicians to diagnosis, treat and prevent this illness.

Keywords: *retrovirus, FIV, FeLV, retrospective study, Felis catus*

*Author for correspondence. E-mail: artur_brihante@hotmail.com

¹Autonomous Veterinarian. E-mail: vivirodolfo@hotmail.com

²Veterinarian, Department of Animal Science, Universidade Federal Rural do Semi-Árido (UFERSA). E-mail: artur_brilhante@hotmail.com

³Autonomous Veterinarian. E-mail: ms.bochnakian@hotmail.com

⁴Professor, Doctor, Department of Animal Science, Universidade Federal Rural do Semi-Árido (UFERSA). E-mail: valeria@ufersa.edu.br

⁵Veterinarian, Master, Veterinary Hospital, Universidade Federal Rural do Semi-Árido (UFERSA). E-mail: kilder@ufersa.edu.br

Introduction

The feline immunodeficiency virus (FIV) and the feline leukemia virus (FeLV) are retrovirus related to important infectious contagious diseases that affect domestic cats, which are the feline immunodeficiency and feline leukemia, respectively. Such infections are generically denominated retroviruses (GREENE, 2015). These etiologic agents are responsible for immunosuppressant and debilitating effects, predisposing the animal to numerous secondary illnesses, such as, bacterial and fungal infections, myeloproliferative disorders, neurological dysfunctions and neoplasia (HARTMANN, 2012). In this sense, the investigation of these pathogens is

fundamental in the clinical approach of felines (LAPPIN, 2010).

It is known that these viruses present global distribution, with prevalence varying according with the location in study (GREENE, 2015). Nevertheless, epidemiological studies in Brazilian territory are still scarce. Nationally, seroepidemiological surveys showed prevalences varying from 4.14% to 16.6% for FIV, and from 1.58% to 32.5% for FeLV (HAGIWARA et al., 1997; RECHE-JÚNIOR et al., 1997; SOUZA et al., 2002; TEIXEIRA et al., 2007; LARA et al., 2008; SOBRINHO et al., 2011). This variation observed had direct interference of the cat's lifestyle, and the high incidence of FIV and FeLV were

especially influenced by the outdoor access and allocation in agglomerates, respectively (GREENE, 2015).

Thus, the aim of the present study was to investigate, retrospectively, the prevalence of FIV and FeLV infections and its respective epidemiological profile, in felines attended at a veterinary teaching hospital.

Material and Methods

An epidemiological study was performed, using the cases of FIV and FeLV infection diagnosed by the small animal medicine department of the Veterinary Teaching Hospital from Universidade Federal Rural do Semi-Árido (UFERSA, Mossoró, Rio Grande do Norte, Brazil).

Data were obtained from medical records of the felines admitted between October 2011 and July 2016. From the total of cats attended, a screening was made to select the animals submitted to the test to detect anti-FIV antibodies and FeLV antigens, from blood, plasma or serum samples. The animals were tested by the Snap FIV/FeLV immunoenzymatic assay (Idexx[®]) and the FIV Ab/FeLV Ag

Bioeasy immunochromatographic assay (Alere[®]). Medical records were reviewed to collect individual information, such as sex, age, breed, lifestyle, associated clinical signs and clinical disorders, and specific therapy institution. Data were presented as absolute and percentage frequencies.

Results

In the period analyzed, a total of 1,752 cats were attended at the Veterinary Hospital from UFERSA, and 159 (9.07%) were submitted to the test for FIV and FeLV. Thirty nine felines (24%) were reagent for FIV, being thirty two (79%) males and seven (21%) females, as presented on Table 1. Only one male cat (0,6%) was reagent for FeLV, and this animal was also coinfecting by FIV.

From all animals that were positive, only twelve (30,7%) had retroviruses as presumptive diagnosis on medical records.

According to breed, from the thirty nine FIV positive animals, thirty five (90%) were crossbred, three (7,5%) were Siamese and one (2,5%) was a Persian. The FeLV positive cat was a Siamese (Table 1).

Table 1. Epidemiological characterization of positive felines for the immunodeficiency virus and leukemia virus attended at the Veterinary Hospital from UFERSA, between October 2011 and July 2016.

	Number of animals	Percentage (%)
Sex		
Male	32	79
Female	7	21
Breed		
Crossbred	35	90
Siamese	3	7,5
Persian	1	2,5
Age		
Up to 1 year	2	5
1 - 3 years	9	23
3 - 6 years	10	25
Over 6 years	13	34
Adult*	5	13

*Animals were put in this category when owners did not know the precise age of their cats.

In relation to the age of the FIV-positive animals, it was observed that two cats had up to one-year old, nine (23%) had between one and three years old, ten (25%) had between three and six years old, and thirteen (34%) had over six years old. The owners from five (13%) animals did not know the precise age of their cats, and they were classified as adults. The FeLV-positive feline was on the adult category.

Considering the lifestyle of the cats from the group FIV-positive, twenty three (60%) animals had outdoor access, while one (2%) lived strictly indoors. The remained fifteen felines (38%) did not have this information on the medical records. The FeLV-positive cat had outdoor access.

Regarding the clinical manifestations, thirty five (90%) animals were presenting at least one symptom or clinical disorder related to FIV infection at the moment of the test, while four (4%) were asymptomatic. The animal coinfecting by FIV and FeLV was symptomatic and was presenting chronic kidney disease, arterial hypertension, retinal detachment and auricular chondritis. The mainly clinical manifestations and associated disorders presented by the group of FIV-positive cats are shown on Table 2.

From the thirty nine animals FIV-positive, only one (2,56%) was submitted to the specific treatment with antiretroviral drug zidovudine.

Table 2. Mainly symptoms and clinical disorders presented by the positive felines for the immunodeficiency virus, attended at the Veterinary Hospital from UFERSA, between October 2011 and July 2016.

Symptoms/Clinical disorders	Number of animals	Percentage (%)
Oral lesions	10	25,6
Neoplasia	6	15,4
Dysphagia	12	30,7
Weight loss	6	15,4
Diarrhea	3	7,5
Ocular disorders	3	7,5
Respiratory disorders	5	12,8
Urinary tract disorders	3	7,5
Auricular disorders	3	7,5
Others	4	10,2

Discussion

The FIV and FeLV were identified in several parts of the world and its prevalence vary according to the geographic area analyzed (GREENE, 2015). In relation to FIV, for example, this variation was observed in seroepidemiologic studies performed in Brazil, demonstrated from 4.14% of infected animals in Belo Horizonte (TEIXEIRA et al., 2007), 5.63% in Araçatuba (SOBRINHO et al., 2011), and from 11,7% to 14.7% in cities from São Paulo State (RECHE-JÚNIOR et al., 1997; LARA et al., 2008), with the highest prevalence found in Rio de Janeiro city, with 16,6% infected cats (SOUZA et al., 2002). In the current research, we found a prevalence higher than these previous studies, and it could be explained by health status of the animals used in the study, since the majority of the cats were sick at the moment of the diagnosis. This corroborates with citations from other authors, which reported a higher prevalence on FIV in sick animals (CALDAS et al., 2000; SOUZA et al., 2002; LARA et al., 2008).

The prevalence of FeLV also presents a similar variation observed for FIV and, in Brazil, the published data show from 0.33% to 32.5% of in infected animals in different cities (HAGIWARA et

al., 1997; RECHE-JÚNIOR. et al., 1997; SOUZA et al., 2002; TEIXEIRA et al., 2007; SOBRINHO et al., 2011). Based on the low incidence of FeLV infection in the work in discussion, we suggest that this virus presents a reduced prevalence in Mossoró. However, it is important to highlight that the number of animals used in the present study was not sufficient to infer the real rate of infection by FIV and FeLV, since just a small group of animals was tested, mainly, because of the non-authorization for test execution by the owners. To the best of our knowledge, this study represents one of the first seroepidemiologic investigation for feline retransmission in Mossoró municipality.

The low rate of specific suspicion for FIV and FeLV on medical records was likely due to the immunosuppressant and debilitating characteristics of these viruses, which are usually the basis cause for secondary diseases. Moreover, the clinical signs manifested by the infected cats are very unspecific, and for this reason, is fundamental the knowledge of the epidemiological characteristics of this diseases to the establishment of an early presumptive diagnosis (GREENE, 2015).

In the FIV positive group, the sex of the majority of the infected cats was male, corroborating the data from other studies (TEIXEIRA et al. 2007;

SOBRINHO et al. 2011; FERNANDES, 2015). This finding is justified by the male behavioral characteristics, which are commonly involved in fights for territory and mating, facilitating the infection by this retrovirus, since the virus is present in saliva and transmitted by bites (GREENE, 2015). In relation to the age of the FIV-positive group, most of the animals had over 6 years old, similar to the information found in the literature (RAVI et al., 2010; SILVA et al., 2014). The increased occurrence of the infection in animals of this age is expected because the virus causes a chronic infection, with a prolonged asymptomatic phase, with a late manifestation of symptoms related to the disease, usually when the animal is adult (HARTMANN et al., 2011).

Most of the FIV-positive animals from this study were crossbred, similar to the finding observed by Sobrinho et al. (2011) in Araçatuba municipality (SP), where 88,2% of the infected cats were crossbred. Nevertheless, a higher number of crossbred animals could be due to the breed profile of cats raised in the region.

Little et al. (2009) observed that the risk of FIV infection was 3.43 times higher in animals with outdoor access. Levy et al. (2008) also found that contact with the outside environment increases the chances of infection by the virus (4.3%

prevalence). These citations reinforced, for the research in evidence, the considerable frequency of FIV in animals that had outdoor access. By this it can be said that access to the street by cats is a very important factor in the spread of FIV, given its form of transmission, which occurs mainly through the bite of an infected feline (GREENE, 2015).

Regarding the clinical signs manifested, the number of symptomatic animals was superior than the asymptomatic ones, being in accordance to what was observed in other studies (CALDAS et al., 2000; LARA et al., 2008; SILVA et al., 2014). It is important to highlight that most of the symptoms and clinical disorders presented by the infected cats were similar to those described by other authors (HOSIE, 2009; SOBRINHO et al., 2011; SILVA et al., 2014).

The small number of animals submitted to specific treatment with antiretroviral drugs was due to the difficulty in acquiring these medicines. According to Brazilian rules, the drugs can only be obtained with a specific prescription from DST/AIDS program, from Ministry of Health, making impossible its obtainment and use in animals (MAZZOTTI, 2014).

In spite of the different methodologies used to test the animals, the

obtained results can be considered reliable, as demonstrated by Westman et al. (2015). These authors compared efficiency of the immunoenzymatic assay and the immunochromatographic assay, and the results showed that the tests were similar and precise to detect the infection by FIV.

Only one animal was positive for the detection of FeLV antigens and for this reason it was not possible to determine an epidemiological profile for feline viral leukemia in this study. This animal was coinfecting by FIV, and was manifesting auricular chondritis. This disorder is considered an uncommon autoimmune disease in domestic cats, characterized by inflammation and destruction of auricular cartilage, and eventually is associated with retroviral infection (COSTA et al., 2009).

Our data demonstrated that FIV might be endemic in domestic cats in Mossoró, suggesting the development of further studies to confirm this hypothesis. However, the FeLV seems to be an infectious contagious agent with low importance in this municipality.

Conclusion

The results of this research demonstrated that cats above six-year old, male and with outdoor access, presented high risk of FIV infection in the municipality of Mossoró. The epidemiological knowledge of feline viral

immunodeficiency is very important for the clinicians to diagnosis, treat and prevent this illness.

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