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FELINE LEUKEMIA VIRUS: SURVEY OF THE PROFILE OF ANIMALS TREATED AT A PRIVATE VETERINARY HOSPITAL IN PORTO ALEGRE FROM MAY 2023 TO MAY 2024

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Abstract: The feline leukemia virus is one of the most prevalent infectious diseases among felines worldwide. Infection with the virus is more prevalent in male cats that have not been neutered, have no defined breed, live outdoors or have access to the street, live in places with a high feline population density, come from regions with a high incidence of the virus or cohabit with infected animals without being vaccinated against the virus. It is diagnosed by detecting the virus from the p27 antigen using rapid tests, also known as Point-of-Care (PoC) tests, or through the PCR technique, which will detect the provirus. Clinical signs vary greatly in cats, the most common being dyspnea, lethargy, anorexia, weight loss, fever, gingivitis-stomatitis and non-healing abscesses. The diseases most associated with progressive infection by the virus include tumors, especially lymphoma; bone marrow suppression, such as anemia; and immunosuppression, leading to chronic and recurrent infections. There is a lack of data on treatments for infected cats, especially with regard to antiretroviral drugs and immunomodulators. The management of these cats focuses on health prevention, identification and immediate treatment of diseases, as well as limiting the spread of infection, and it is extremely important to stage the stage of infection that each cat is in, in order to maintain a good quality of life and appropriate clinical management for these animals. The aim of this study was to carry out a retrospective study of felines diagnosed with feline leukemia virus at a private veterinary hospital in Porto Alegre, based on data collected between May 2023 and May 2024. Breed, age, gender, reasons for consultation, diagnosis used, vaccination status and clinical findings of the affected felines were checked in the records. 14 animals were diagnosed during this period.
Keywords: infectious disease; retrovirus; cats; felv; immunosuppression

INTRODUCTION

FeLV, or feline leukemia virus, is one of the most prevalent infectious diseases among cats worldwide (August, 2009). First described in 1964 in a cat with lymphoma (Willett, Hosie, 2013), FeLV is an enveloped RNA virus that belongs to the *Gammaretrovirus* genus of the Retroviridae family (Sykes, Hartmann, 2014). Although its official discovery only took place in 1964, genomic studies reveal that FeLV evolved from a virus present in an ancestor of mice, and it is believed that this transfer took place around 10 million years ago in the North African desert, a region once inhabited by both animals (Little, 2012). The clinical signs of FeLV vary greatly between infected cats, with some of the most common symptoms being dyspnea, lethargy, anorexia, weight loss, fever, gingivitis-stomatitis and non-healing abscesses (Norsworthy *et al*., 2011). Common diseases associated with progressive FeLV infection include tumors (especially lymphoma), bone marrow suppression (such as anemia) and immunosuppression, resulting in chronic or recurrent infections (Hofmann-Lehmann, Hartmann, 2020). FeLV infection is confirmed by detecting the virus (Little, 2012), mainly from the p27 antigen using Point-of-Care tests, also known as rapid tests, and detecting the provirus using the PCR technique (Little *et al.,* 2020). FeLV infection is more prevalent in cats without a defined breed, who live outdoors, who are not neutered, who live in places with a high feline population density (five or more cats), who come from regions with a high incidence of the virus or who cohabit with infected animals without being vaccinated against FeLV (Lutz *et al.*, 2009). There is a lack of data on treatments for infected cats, especially with regard to antiretroviral drugs and immunomodulators. Management of infected cats focuses on effective preventive health care strategies, prompt identification and treatment of disea-

se, and limiting the spread of infection (Little *et al.,* 2020). Cats with progressive FeLV infection have a reduced life expectancy, but can be asymptomatic and maintain a good quality of life for many years (Hofmann-Lehmann, Hartmann, 2020), which is why it is important to stage the stage of infection that each cat is in, as it can influence the prognosis and clinical management of these animals (Hofmann-Lehmann, Hartmann, 2020). The aim of this study was to carry out a retrospective study of felines diagnosed with feline leukaemia virus at a private veterinary hospital in Porto Alegre, based on data collected between May 2023 and May 2024, characterizing them according to breed, age, sex, reproductive history, diagnosis used, vaccination status and clinical signs.

MATERIALS AND METHODS

A period of one year was selected, from May 2023 to May 2024, to verify the profile of felines with feline leukemia virus (FeLV) infection treated at a private veterinary hospital in Porto Alegre, Rio Grande do Sul, Brazil. The clinic's computerized system was used to analyze the records of all the cats seen during routine and on-call consultations, and from there the animals affected by the feline leukemia virus were selected. The data was analyzed according to the animal's breed, age, sex, diagnosis used, vaccination status, clinical findings and what motivated the owners to seek veterinary care. This information was selected as the main risk factors associated with the increased prevalence of feline leukemia virus infection in patients.

RESULTS

A total of 422 feline cases were seen during the period in question and a total of 14 patients were diagnosed with the feline leukemia virus.

Among the feline breeds identified were: eleven animals with no defined breed (SRD); one Siamese; one Angora and one English Shorthair. In terms of sex, eight were male (57.1%) and six were female (42.9%)

Age showed little variation in relation to the diagnosis of the disease. There were animals between two and eleven years old, with the youngest felines being the most prevalent, as shown in Figure 1

As for the reasons that led the guardians to the clinic, it was noted that inappetence, apathy, weight loss and vomiting were the most common complaints reported by them, as shown in Figure 2.

With regard to the tests used to diagnose the feline leukemia virus, it was observed that ten patients used rapid tests of different brands. Seven felines used the ALERE brand and three animals used the IDEXX brand. In four cats, the guardians had already been diagnosed with the infection, without prior information on which test was used for the diagnosis (Figure 3).

Regarding the vaccination status of these felines, it was observed that eleven felines did not follow the protocol with the vaccine against feline leukemia virus (FeLV). Among the felines with up-to-date vaccination protocols, one had been vaccinated with a fivefold vaccine, another had received the first fivefold dose and the second fourfold dose, and the guardian of the third feline was unable to say which vaccine had been administered.

When checking the clinical findings found by veterinarians in clinical examinations during consultations and hospitalizations, we can see that dehydration, hypochlorous mucous membranes, inappetence and anemia were the most recurrent clinical findings observed in these patients diagnosed with feline leukemia virus (Figure 4).

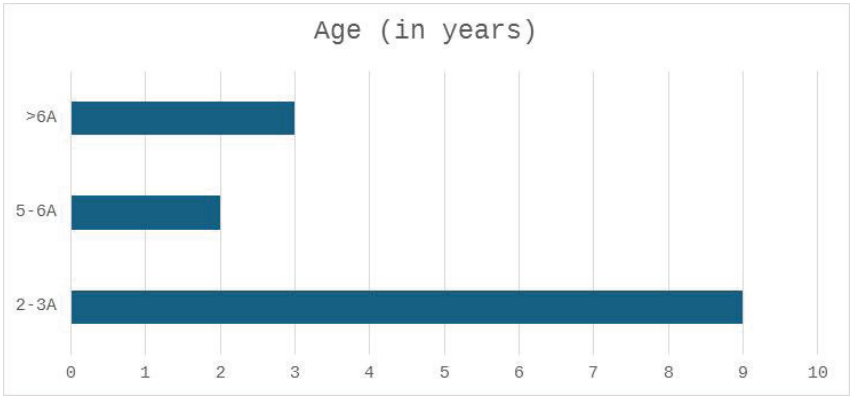

Figure 1 - Graph of feline cases diagnosed with feline leukemia virus at a Veterinary Hospital in Porto Alegre, according to age, between May 2023 and May 2024. Source: the author, 2024.

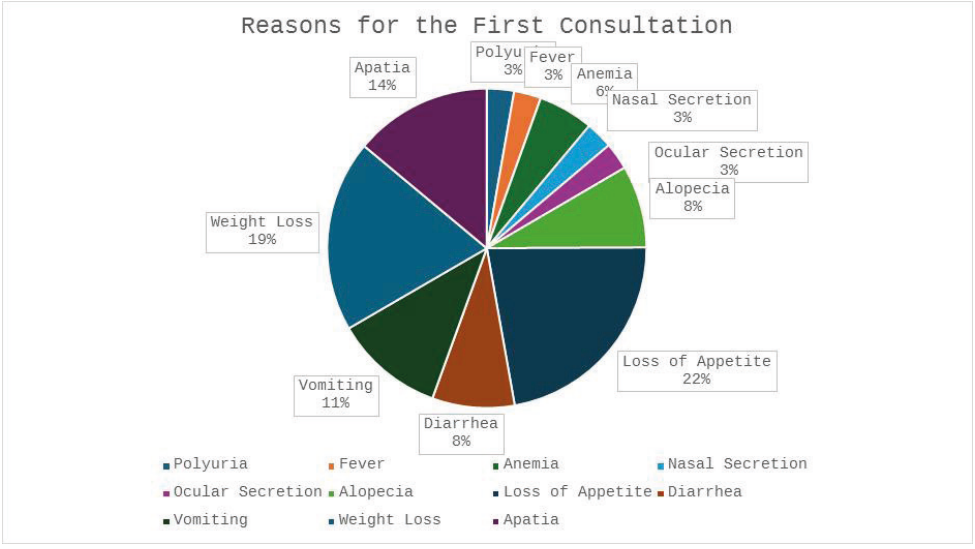

Figure 2 - Graph of the main reasons why owners went to the veterinarian for felines diagnosed with feline leukemia virus (FeLV), at a private veterinary hospital in Porto Alegre, between May 2023 and May 2024. Source: the author, 2024.

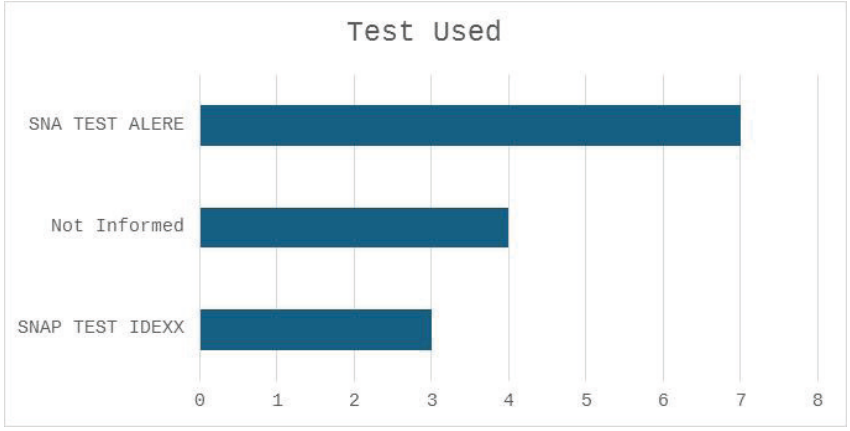

Figure 3 - Graph of the type of tests carried out to diagnose felines infected with feline leukemia virus (FeLV), at a private veterinary hospital in Porto Alegre, between May 2023 and May 2024. Source: the author, 2024.

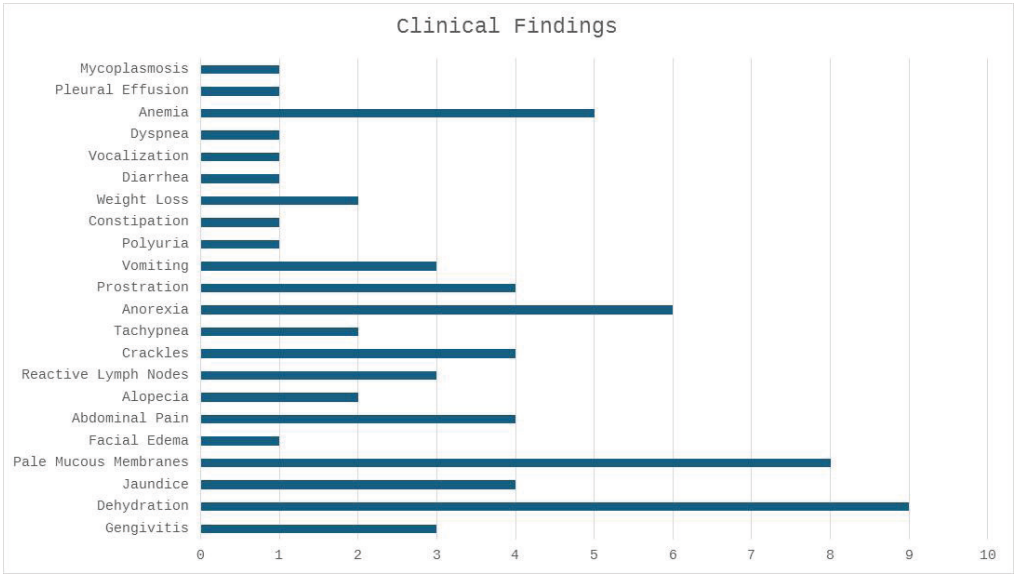

Figure 4 - Graph of clinical findings found by veterinarians during consultation and hospitalization of felines diagnosed with feline leukemia virus (FeLV), at a private veterinary hospital in Porto Alegre, between May 2023 and May 2024. Source: the author, 2024.

DISCUSSION

In relation to the feline breeds observed in this study, purebred (SRD) animals had a higher incidence of feline leukemia virus infection, which corroborates Hofmann-Lehmann and Harmann (2020) and differs from Zanutto, Costa and Araújo (2023). This result may be due to the lower frequency of the disease in purebred cats because they are kept more indoors and because the breeding community generally has a higher level of awareness of the feline leukemia virus (Studer *et al.*, 2019, Hofmann-Lehmann, Harmann, 2020). Other studies suggest that animals living on the streets before adoption, especially SRDs, are at greater risk of contracting the disease (Souza *et al.*, 2024). Given Brazil's socio-economic scenario, the abandonment of animals on the streets of large and small cities is common and growing. This issue is a major public health challenge, given the risk of transmission of zoonoses to humans, but it is also a high risk for animals, who are subject to aggression, fights among themselves and dangerous situations, which increase the rates of transmission of diseases, including retroviruses such as the feline leukemia virus (Scherer *et al.*, 2021).

Regarding the distribution between the sexes, it was observed in the current study that of 14 animals, six were females and eight males, with no prevalence in the diagnosis of feline leukemia virus, which is similar to the data found by Lee *et al.*, 2002, Muirden, 2002 and Costa *et al.*, 2017. However, this differs from more recent studies by Levy *et al.*, 2006, Gleich, Krieger, Hartmann (2009), Luckman, Gates (2017) and Biezus *et al.*, 2019, which found a significantly higher risk of feline leukemia virus infection among male cats due to aggressive behavior, with fighting between males being one of the most important forms of transmission of the disease (Hartmann, Hofmann-Lehmann, 2020; Little *et al.*, 2020).

As for age, we can say that it is one of the most important host factors, which will determine the course of the infection and the clinical outcome of the disease (Hoover *et al.*, 1976). In relation to the cats in the study, the infection was diagnosed in young, adult and geriatric cats, but most of the records evaluated were from animals between two and three years old. These results agree with Sykes and Hartmann

(2014), who described that the average age of felines affected by the feline leukemia virus is three years, reflecting the high degree of pathogenicity of the virus and its ability to reduce the lifespan of these animals. However, although susceptibility to feline leukemia virus infection is higher in young cats, due to their greater vulnerability to infection during the first few weeks of life (Lutz *et al*., 2009), the lifetime risk of exposure translates into a slightly higher prevalence of the disease in older animals (Little *et al*., 2020). As cats mature, they acquire increasing resistance and, when older cats are infected, they tend to have abortive or regressive infections, but they can also develop progressive infections, showing milder signs and a longer period of life and good health (Hartmann, Hofmann-Lehmann, 2020).

In the present study, we can see that there are more recurrent factors that led owners to seek veterinary care, such as inappetence, weight loss and apathy, which corroborates Demkin and Kazakov (2021). In a study by O'Connor *et al*., 1991, weight loss was the most common clinical sign reported in cats with symptoms of feline leukemia virus presenting for veterinary care, followed by fever and dehydration. According to Norsworthy (2011), the clinical manifestation of the virus is quite variable, but can often include dyspnea, lethargy, anorexia, weight loss, fever, gingivostomatitis and hard-to-heal abscesses.

The tests used to diagnose the condition in question were mostly rapid tests, which are also called point-of-care (PoC). Seven cats were diagnosed by the ALERE test and three by SNAP. Accurate diagnosis of the feline leukemia virus (FeLV) is essential for controlling the disease, allowing more appropriate measures to be implemented and avoiding hasty actions such as segregation, euthanasia and abandonment of affected animals. Therefore, rapid tests are crucial for speeding up the clinician's approach, with good sensitivity and specificity, which is why they have been chosen as the screening method of choice (Medeiros *et al*., 2019). Diagnosing the virus can be challenging due to the variability in detecting the disease using serological methods. In regressive, focal and abortive infections, the p27 antigen is not circulating, resulting in false-negative cats in serological tests, in which case the PCR technique is the only viable option for identifying proviral DNA and RNA to confirm the presence of the virus (Hofmann-Lehmann *et al*., 2008). In general, most infected cats will test positive 30 days after contact with the virus, and antigenemia may develop more slowly in some animals (Little *et al*., 2020).

As for the vaccination status of the felines in this study, eleven animals were found not to follow the vaccination protocol with the feline leukemia virus vaccine, which corroborates Hartmann and Hofmann-Lehmann (2020) who cite cats not vaccinated against the virus as one of the risk factors influencing the prevalence of infection. However, although the vaccine is an important tool for prevention, it remains challenging to assess its effectiveness (Little *et al*., 2020). According to the authors Sykes and Hartmann (2014), although no vaccine guarantees total protection against infection by the feline leukemia virus, it is indicated for all cats at risk, such as those exposed to the outdoors or living with other cats who have the infection, as it has the ability to prevent them from the disease in its most severe and progressive form. The *American Association of Feline Practitioners* (AAFP) also recommends vaccination against FeLV for all cats at risk, including kittens up to one year of age, because in addition to being susceptible to environmental and behavioral changes, which can alter the risk of exposure to the disease significantly after acquisition, kittens are more susceptible to the progressive form of the disease compared to adult cats (Little *et al*., 2020).

With regard to clinical findings, dehydration, pale mucous membranes, inappetence and anemia were the most common findings among cats diagnosed with feline leukemia virus, which is similar to the studies by O'Connor *et al*. (1991) and Gleich and Hartmann (2009). As we can see in this study, the feline leukemia virus can cause a variety of clinical signs such as alopecia, respiratory changes, reactive lymph nodes, among others. Infection with the virus can lead to serious health problems in cats, with the progressive form of the disease associated with reduced life expectancy. The immunosuppression caused by the virus paves the way for the development of various secondary diseases, which represent the main cause of the symptoms observed in infected animals, and it is crucial to point out that many of these secondary diseases can be successfully treated, providing a better quality of life for felines affected by FeLV (Hartmann and Hofmann-Lehmann (2020).

CONCLUSION

The feline leukemia virus is one of the retroviruses that most affects cats worldwide. It can be diagnosed by screening tests, as the rapid tests are called, and more reliably by performing quantitative PCR for proviral DNA and RNA. Analyzing the data obtained from the records of these patients diagnosed with the feline leukemia virus at a private veterinary hospital in Porto Alegre between May 2023 and May 2024, we can see a profile pattern, where the majority are felines without a defined breed, of both sexes, aged between two and three years, who did not have their vaccination protocol up to date. Inappetence, apathy, weight loss and vomiting were the most common complaints among the owners who sought veterinary care. And even though this is a disease with a wide range of clinical signs, we can highlight that dehydration, pale mucous membranes, inappetence and anemia were the most common clinical findings among the veterinarians who attended and monitored these animals during hospitalization. Although recent studies show a decrease in the prevalence of the disease since the 1980s, we must remain alert and make as many people as possible aware of this important infection that affects many cats and its prevention. Control of the virus depends on a range of measures, including the implementation of strict testing and vaccination protocols, comprehensive community education programs and appropriate environmental management practices.

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