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Research Article

Analysis of Prevalence of Feline Viral Leukemia in Region of Uberlândia-Brazil and Associated Risk Factors

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Abstract

Feline Viral Leukemia (FeLV) is a highly contagious infectious disease that affects domestic and wild felines worldwide and is not transmitted to humans. It is caused by the Gammaretrovirus, which is responsible for causing immunosuppression and oncogenicity, associated with concomitant infections that can lead to the death of the animal. The main source of infection is viremic cats, being transmitted through saliva, oronasal route and by indirect contact. The purpose of this study was to carry out a retrospective survey to analyze the risk factors that predispose to the incidence of FeLV in the region of Uberlândia-MG. A total of 162 medical records of domestic cats were examined between June 2023 and March 2024. Laboratory tests were analyzed by Chromatographic Immunoassay for qualitative detection of FeLV p27 antigens. The results indicated 26 reactive animals, obtaining a prevalence and morbidity percentage of 16.04%, 2 of these animals presented co-infection for (FIV+ and FELV+). The calculation of the average rate of accumulated prevalence, a variable of 12.85% was noted. Regarding the indicators regarding sex, 14.90% males were observed, against 9% reactive females, the proportion between male/female was 1.89:1, without a significant proportion in the data. Regarding prevalence, it was observed that for every 100 animals examined, 16 were reactive to the virus. It was noted that the lack of data collection and storage makes it difficult and impossible to perform a more assertive and expressive analysis of the true situation, justifying the high rate of variation in the prevalence of infection in the city.

Keywords: FeLV; Lymphoma; Immunosuppression; Serotypes; Retrovirus

Introduction

The feline population density is increasingly higher in Brazil, due to cohabitation with humans, according to the Pet Institute Brazil Census (IPB 2022) [19], which stipulates that there was a 6% increase in the population over the year, totaling an average of 27.1 million felines in the country. This indicates that the preference for cats as pets has been increasing [2,27].

The overpopulation of cats has increased the growth and persistence of transmissible viral infections, among which Feline Viral Leukemia (FeLV) stands out as one of the most important diseases, affecting all species of felids, with domestic cats being the most susceptible. It has a cosmopolitan distribution, is easily contagious, and has a high degree of virulence, with tropism for various tissues, favoring the production of diverse clinical symptoms, making it a highly emergent disease today [6,22,24,25].

FeLV was reported by William Jarrett in 1964; it is an infectious and contagious disease caused by a retrovirus with single-stranded RNA, with a lipoprotein envelope, from the Retroviridae family,

with the ability to introduce its genetic material into the genome of the infected animal's cells. Its replication is dependent on a mediator DNA [17,29] and transcribed into pro-viral DNA due to the action of this enzyme, resulting in the formation of new cells, leading to persistent viremia in the host's body [9,18,25]. This virus belongs to the genus Gammaretrovirus, subfamily Orthoretrovirinae. Characterized by causing immunosuppression and oncogenicity, linked to myeloproliferative and degenerative alterations [11,17,27].

The infectivity caused by the FeLV virus is related to risk factors such as crowding or overpopulation of animals, the age of the animal at the time of infection, with the highest predisposition for males and young animals, in the age range of 1 to 5 years, lack of environmental hygiene, animals that have access to the streets, and concomitant diseases, representing the main cause of cat deaths due to contagious diseases [6,14,17,23].

The main cause and source of FeLV infection are viremic cats, with subclinical felines being the primary spreaders of the disease. Transmission occurs mainly through direct contact with saliva via the oronasal route, through licking and biting, or indirectly through sharing water and food between animals, fomites, and can be transmitted horizontally and vertically via transplacental and lactogenic routes [8,9,23]. The virus can also be present in various bodily secretions such as nasal secretions, tears, plasma, milk, urine, feces, placenta, and semen. Enabling the risk of iatrogenic transmission through contaminated materials and blood transfusions [6,8,11].

FeLV is not a zoonosis and does not pose a risk to humans; however, in felines, it is a severe disease that most concerns veterinarians, as it causes weakening of the immune system, leading to the proliferation of defective cells and the appearance of leukemia and lymphomas. It is associated with secondary effects resulting from opportunistic infections such as recurrent otitis, stomatitis, chronic gingivitis, enteric and respiratory problems. It is a disease that requires medical follow-up and appropriate treatment, as it causes pain and can be fatal [7,10,14]. However, despite its virulence, the virus does not survive long outside the host, as it is unstable in the environment and sensitive to most disinfectants and heat, and can be easily inactivated through the use of detergents and common hospital disinfectants, such as isopropyl alcohol and quaternary ammonia, making contamination due to the environment unlikely [23].

FeLV is a highly infectious disease, with a high contamination rate, and severe for felines, affecting both domestic and wild animals; however, it is not transmitted to humans or other species, besides felids. Subclinical animals are the main disseminators of the disease [17,22,23], and considered a source of infection, male and young cats have a higher predisposition to the disease [17,29].

FeLV is an immunosuppressive disease that affects the bone marrow, causing uncontrolled hematopoietic proliferation of defense cells, associated with cases of lymphosarcomas, resulting in greater vulnerability to secondary infections, transmitted mainly through saliva, via the oronasal route, representing the leading cause of death among infectious diseases in felines [1,10,18].

The transmission and prevalence of FeLV are related to risk conditions, such as the age of the animal, high population density (crowding), lack of environmental hygiene, and animals that have access to the street, with these being more likely to develop the infection, since transmission occurs mainly through direct contact [8,17]. Transmission can also occur through fomites, iatrogenic means via transplacental routes, and through bodily secretions [9,23].

Given the risk aspects caused by FeLV such as immunosuppression, correlated with secondary infections, easy contagion, and high viral spread, FeLV stands out as one of the most important infectious and contagious diseases in felines [3]. Due to the great gravity and severity of the disease, it is therefore primordial and essential to carry out rapid and highly accurate diagnoses to reduce the spread of the disease to healthy animals [3,23].

Based on the epidemiological study related to the risk factors and the consequences caused to cats by FeLV infection, it was necessary and fundamental to conduct this study. The general objective of this study was to conduct a retrospective data survey of the epidemiological indicators of FeLV in the region of Uberlândia in the state of Minas Gerais, in order to analyze the prevalence and occurrence of the disease in the city. It therefore becomes essential to conduct a survey of cases to determine the estimated prevalence of occurrences, morbidity, and the ailments caused by

the FeLV provirus in domestic animals in the region of Uberlândia – Minas Gerais. Also having the interest of more effectively assisting in treatment, diagnostics, and preventive prophylaxes, in order to avoid the spread and proliferation of the virus, as well as contributing to the improvement of the well-being and quality of life of seropositive animals.

Methodology

The samples for the present study were collected from retrospective data of animal records from five private, reputable veterinary clinics located in the city of Uberlândia-MG, Brazil. The samples consisted of 162 animals examined between June 2023 and March 2024, regardless of breed, sex, age, and that exhibited some pathologies suggestive of the disease and had access to the street and other felines, or for the initiation of the vaccination protocol, in which they were subjected to clinical examinations and serological tests to conclude the diagnosis.

Based on the collected data, an evaluative analysis of the selected articles and documents was conducted, seeking the occurrence and prevalence of the disease, in which the risk factors that predispose to the emergence of new cases of infectibility of the disease, its epidemiological chain, and the consequences caused by the virus for the feline population were analyzed and described.

Of the 162 samples collected, 64 of them were sent and analyzed by a reference laboratory center located within the city of Uberlândia, where the Chromatographic Immunoassay method (AlereTM FIV/Ac FELV/Ag) was used, and the remaining samples were analyzed at the clinics themselves using the ELISA test (SNAP – FIV/FELV – IDEXX). For the qualitative detection of FeLV p27 antigens.

These animals underwent a complete anamnesis in which their data was filled out in their medical records. For the performance of the exams, the animals underwent blood sample collection. These samples were obtained through venipuncture of the jugular, cephalic, or femoral vein, taking into account the clinical and physical condition of the animals. These blood samples were used for performing complete blood counts and rapid tests for sensitivity and specificity, following all the manufacturer's instructional and required standards.

Results and Discussion

FeLV is a disease that constantly affects felines, with a global distribution ranging from 1% to 38%. In Brazilian territory, the seroprevalence averages around 34% in some regions of the country. In healthy animals, some studies report a prevalence of 1.4% to 15.6%, and in sick cats, it varies between 7.6% and 30.4% [1,7,10].

Various factors can influence how the infection progresses in the animal, such as age, the infectious viral load to which it was exposed, the route and duration of exposure to the virus, the animal's immune status, or the presence of concomitant diseases. After infection, the virus multiplies in the body's defense cells such as macrophages and lymphocytes, with the potential to spread to other tissues in the body [3,17].

It is noted that the risk factors for the spread of the virus are determinants for how the infection can manifest, which can be identified as progressive when there is intense multiplication in the bone marrow and lymphoid tissues, characterizing it as a permanent viremia. In the regressive form, depending on the immunity of the affected animal, or in the abortive form, where it shows resistance to the virus, preventing the multiplication of the virus in its genetic material, thus preventing viremia. Focal manifestation can also occur, where the virus replicates in nonspecific locations, such as the spleen, lymph nodes, urinary bladder, and mammary glands [3,23].

A peculiarity of FeLV compared to other retroviruses is that the animal can regress from the disease, meaning the animal can be seropositive but completely eliminate the virus from its body, becoming non-pathogenic [12,26]. FeLV is a dynamic disease, currently characterized by five different virus serotypes, namely FeLV-A, B, C, D, and T variants, each with a specific receptor for each subgroup. The serotype that transmits the disease is the FeLV-A subgroup, being the most common among the serotypes and present in every infected animal, despite being the least virulent among them [8,16].

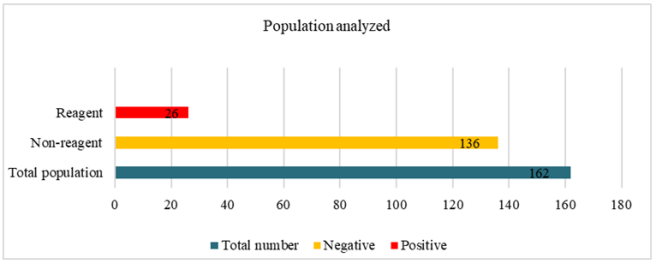
The core of the FeLV virus contains several proteins, among them the p27, which is of greater importance and common in the nucleocapsids of all serotypes, being a specific antigen of Gammaretroviruses. Therefore, the detection of the FeLV virus

is diagnosed through this protein in rapid ELISA tests, as p27 is found in abundance in infected animals, being present in various secretions such as saliva, tears, blood, plasma, and serum, making it a good marker for infection detection [3,12,16].

Epidemiology can be defined as the study of events related to the health of a population, examining the distribution and factors that determine diseases, disorders, and events associated with general health, acting in the planning of preventive measures, control or elimination of these, in addition to assigning information indicators that assist in the planning, administration, and evaluation of the actions taken [13].

The survey on the real prevalence of FeLV is difficult to define, due to the high population density, the number of stray animals, the optional nature of the tests, the lack of data collection by a responsible agency, and the use of various diagnostic mechanisms employing rapid tests, resulting in enormous variation in the data depending on each studied region [4,5,15].

The research results showed that out of the 162 animals examined, 26 were confirmed to be infected with FeLV. Of these seropositive animals, 2 presented with co-infection (FIV and FELV positive), as shown in graph 1. The diagnostic methods used for this study were Chromatographic Immunoassay (AlereTM FIV/Ac FELV/Ag) and ELISA (SNAP – FIV/FELV – IDEXX), which are highly sensitive and specific, allowing the detection of p27 antigenemia. However, they are not suitable for confirming the presence of proviral DNA in cats that exhibited the regressive infection, which may result in false-negative results [16,28].



Graph 1: Distribution of the total population and non-reactive and reactive animals.

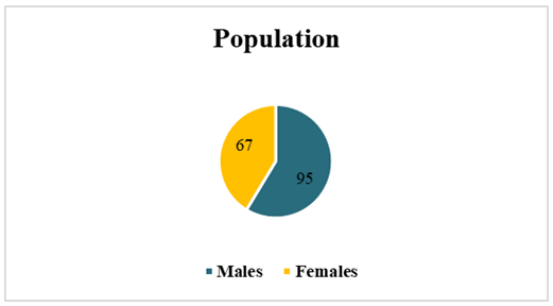
Upon analyzing Graph 1, it was noted that the percentage referring to the accumulated prevalence and morbidity of the disease in the total evaluated population was 16.04%, calculated as follows: the ratio of the total number of positive cases during the months of the retrospective research to the total number of animals attended to and examined during the same period. In which it was noted that the prevalence of FeLV in Uberlândia is 16 reactive cases for every 100 animals in the region, according to the sample size of this study.

For the analysis of the variable prevalence rates in the different surveyed locations, the information collected over the 10-month study period was presented separately and in tabular form, detailing the total number of animals examined and the total number of reactive animals in each unit, as shown in Table 1.

Origin	Nº Animals	Positive	% Prev. Total on Population
Clinic 1	37	5	13,51
Clinic 2	64	16	25
Clinic 3	23	2	8,69
Clinic 4	22	1	4,54
Clinic 5	16	2	12,5
TOTAL	162	26	Variable from 12.85

Table 1: Quantitative relationship of the average rate on the population of reactive animals in Uberlândia – MG.

When analyzing Table 1, we noted that the average rate of accumulated prevalence of cases recorded by clinic showed a variable average rate of 12.85% among the positive cases. It is observed that when evaluating each clinic individually among the examined patients and the confirmed cases, the prevalence percentage decreased, demonstrating the variability and difficulty in calculating the real prevalence of the infection in the city. Regarding the sex of the animals, a total population of 162 animals was evaluated, of which 67 were females and 95 of the examined and tested cats were males, as shown in Graph 2.



Graph 2: Population distribution of examined animals in relation to sex.

Among the animals in the study regarding sex, the difference in the proportion of males and females testing positive for the infection was not significant, with 17 of them being males compared to 9 females, as described in Table 2.

Origin	Nº Animals		Positive			
	Males	Females	Males	%	Females	%
Clinic 1	19	18	3	15,79	2	11,11
Clinic 2	38	28	10	26,31	6	21,42
Clinic 3	15	8	1	6,66	1	12,50
Clinic 4	11	9	1	9,09	-	-
Clinic 5	12	4	2	16,66	-	-
TOTAL	95	67	17	14,90	9	9,00

Table 2: Quantification of FeLV-reactive animals, according to sex, in the city of Uberlândia - MG.

According to Table 2, it was observed that 14.90% of the male animals analyzed were reactive, unlike the females which showed an infection rate of 9%, resulting in a male/female ratio of 1.89:1, disagreeing with Barbosa., *et al*. [4,5], who stated that the male/female ratio is 1:2.5. The research demonstrated that there was no significant proportion in the data regarding the attendance in relation to the sex of the animals infected by the FeLV virus. Regarding the age of these animals, a population with an age range between 3 months to 7 years of life was evaluated.

The study prioritized a descriptive survey which determined the prevalence of total cases, since the data obtained for this research were absolute values, not showing the differentiation of occurrences between new and old cases, as they only contained the sex of the animals, approximate age range, total number of animals treated, and total number of seropositive animals. This was due to the ethical and moral standards of the clinics in safeguarding and preserving patient data, which keeps the records more confidential. Due to these conditions, it was not possible to calculate and measure the incidence rate.

Regarding the mortality and lethality of the disease, the rate was insignificant for the study, as there were no reports of deaths resulting from disease complications during the retrospective period of the research. In the study conducted by Barbosa., *et al*. [4,5], at the Veterinary Hospital of Uberlândia (UFU) and the Zoonoses Center of Uberlândia, 135 animals were analyzed and tested, of which 17 tested positive, presenting a prevalence of 12.59%. Of the positive cases, 20% were from the Zoonoses Center, and 5.71% from samples originating from UFU. Regarding the infection related to the sex of the animal, 15.18% were females, and 8.92% were males [4,5], demonstrating the opposite of this work, which showed a higher prevalence of infection in male cats.

In another study also conducted in the city of Uberlândia by Watanabe., *et al*. [28], a retrospective study of medical records of

animals treated at the Veterinary Hospital of Uberlândia (UFU) was carried out between the years 2018 and 2019, where 253 animals were subjected to clinical evaluation and tested for the FeLV retrovirus, of which 45 of these animals tested positive for the virus, demonstrating a prevalence of 17.78%, with some of these positive animals showing co-infection for FIV and FeLV. Among those positive only for Feline Leukemia, according to the authors, the age range was between 1 month and 1 year, and regarding sex, half were male/female (16/32) [28].

Upon observing the works conducted by Barbosa., *et al*. [4,5] and Watanabe., *et al*. [28] alongside the present study, the average variation in the prevalence of the Feline Leukemia Virus in the city of Uberlândia is noted, depending on the examined area, which presented an average rate between 12.59% and 17.78%, according to each location and moment analyzed.

Given this scenario, the importance of data collection and storage is evident, as the absence of these hinders and makes it impossible to conduct a more accurate and expressive analysis of the true situation of the harm to the feline population caused by the infection, which justifies the high rate of variation in the prevalence of FeLV in various locations in the city.

Another important factor is the high population density of felines, which can result in increased dissemination and proliferation of the virus. Additionally, many veterinary medical centers in the region mostly conduct only rapid tests like ELISA, but these tests do not detect animals infected in the regressive form of the disease, leading to false-negative results and making it difficult to assess the true situation of the disease in the city's animals.

The importance of conducting tests with greater accuracy, such as PCR, which is the confirmatory method with the ability to detect the sequence of pro-viral DNA genes installed in infected cells, and RT-PCR, which identifies and quantifies the antigen's RNA even in the absence of cells, except during the latency stages of the disease, in which the virus is found only as a provirus in the animal's body due to the absence of viremia, is emphasized [20,21].

Therefore, it is worth emphasizing the need for new studies on the disease in the Uberlândia-MG region, so that more efficient prophylactic measures can be taken, preventing the spread and incidence of new cases, as well as being able to measure the real situation and the complications caused by the virus in the city.

Conclusion

With the help of this study, it was possible to observe that Feline Viral Leukemia has a morbidity rate of 16.04%, with an average prevalence of 12.85% in the routines of clinics in the city of Uberlândia-MG. The result of this research did not show a significant proportion of infection in relation to the sex of the animals, as the rate was 1.89:1 males/females infected. It was also noted that the lack of data storage and the high number of animals without clinical follow-up hinder and make it impossible to conduct a more accurate and expressive analysis of the real prevalence of infected animals in the region. It is also important to point out that the use of only rapid methods in screening and the absence of confirmatory tests such as PCR or RT-PCR can lead to failures, as these tests yield negative results in cases of animals infected with the regressive form of the disease.

Bibliography

1. Accioly MJAR. "Seroprevalence of Feline Immunodeficiency and Leukemia Viruses at the Sylvio Barbosa Cardoso Veterinary Hospital/UECE". *Animal Science* (2023).

2. Alves HHS and Teixeira NR. "Epidemiological analysis of domestic felines (Felis catus) in the municipalities of Belém-Pa and Ananindeua-Pa, diagnosed with Feline Immunodeficiency Virus (FIV) and Feline Leukemia Virus (FeLV), from 2019 to 2023". *Pubvet* (2024).

3. Alves MCR. "Feline Viral Leukemia: Review". *Pubvet* (2015).

4. Barbosa FC. "Prevalence of feline leukemia in domestic cats in Uberlândia – MG". *Archive of Veterinary and Zoological Science UNIPAR* (2001).

5. Barbosa FC., *et al*. "Prevalence of Feline Leukemia in Domestic Cats in Uberlândia - MG". *Archive of Veterinary and Zoological Sciences of UNIPAR* (2001).

6. Brum MHC. "Clinical-epidemiological approach and prevention of infection by Feline Immunodeficiency Virus (FIV) and Feline Leukemia Virus (FeLV)". (2023).

7. Carneiro C. "Prevalence of Feline Immunodeficiency Virus (FIV) and Feline Leukemia Virus (FeLV) in a cattery in the municipality of Uberlândia–MG–a case study". *Biosphere Encyclopedia* (2020).

8. Carreiro ASLCO. "Frequency of feline immunodeficiency virus and feline leukemia virus in stray or feral cats on the Island of São Miguel, Azores. 2023". Doctoral Thesis. University of Lisbon, Faculty of Veterinary Medicine.

9. Chiu ES., *et al*. "Examen rétrospectif de la caractérisation des sous-groupes de la leucémie féline : essais d'interférence virale à séquençage profonde". *Virusen* (2018).

10. Cobucci GC. "Risk factors and clinical symptoms associated with FELV infection: a case-control study in a veterinary teaching hospital". *Brazilian Animal Science* (2019).

11. De Almeida., *et al*. "Clinical and hematological changes in domestic cats naturally infected with Feline Leukemia Virus (FeLV)". *Health Journal* (2016).

12. De Paula EMN. "Epidemiological characteristics of feline viral leukemia". *Pubvet* (2014).

13. DIAS B. "Profile of services in veterinary clinics in the Federal District". (2021).

14. Dos Santos D L., *et al*. "Epidemiology of Viral Immunodeficiency, Viral Leukemia, and Infectious Peritonitis in felines from a veterinary hospital". *Academic Journal of Animal Science* (2013).

15. Figueiredo AS and ARAÚJO JP. "Feline leukemia virus: analysis of infection classification, diagnostic techniques, and vaccination efficacy using sensitive detection techniques". (2011).

16. Guimarães NLS. "Frequency of diagnosis of FIV (Feline Immunodeficiency Virus) and FELV (Feline Viral Leukemia) in cats treated at the UEMA veterinary hospital from 2019 to 2021, 2022".

17. Gonçalves HJ. "Prevalence of Feline Viral Leukemia (FeLV) and main hematological alterations in domestic felines in Vila Velha, Espírito Santo". *Research, Society and Development* (2021).

18. Hashizume EY. "Prevalence of feline leukemia and viral immunodeficiency in cats treated at the Veterinary Hospital of the State University of Londrina (PR) in 2014, 2016".

19. INSTITUTO PET BRASIL (2024).

20. Levy J., *et al*. "Guidelines for the Management of Feline Retroviruses by the American Association of Feline Practitioners". *Journal of Medicina Felina. Chir.,* (2008).

21. Lutz H., *et al*. "Líneas guía ABCD sobre prevención y manejo de la leucemia felina". *Journal of Feline Medicine and Surgery* (2009).

22. Lutzke D. "Feline Viral Leukemia: General Aspects and Antiviral Therapy". *Special Topics in Animal Science IX*, (2020).

23. Malta LGA. "Retrospective study of hematological changes of FeLV in laboratories of the DF". (2022).

24. Martins NS. "Clinical, laboratory, and epidemiological study of Feline Viral Immunodeficiency (FIV) in the Municipality of São Luís-MA". Doctoral Thesis. UEMA, (2014).

25. Matesco VC. "Infection by the feline leukemia virus: review and case report". (2014).

26. Souza HJM., *et al*. "Feline Viral Leukemia". In: SOUZA, J.M. Anthology on feline medicine and surgery. Rio de Janeiro: Lf Livros, (2003).

27. Stuart LCO., *et al*. "Characterization of Animal Protectors in the Municipality of Belo Horizonte, Minas Gerais". (2023).

28. Watanabe AYC. "Epidemiological, clinical, and hematological aspects of cats positive for feline leukemia virus and/or feline immunodeficiency virus: a retrospective study". (2021).

29. Zanutto MS., *et al*. "Prevalence of feline leukemia and viral immunodeficiency and risk factors in cats treated at a veterinary school hospital in Londrina, Paraná". *Veterinary Medicine* (2023).