Commentary
Volume 08:05, 2024

Journal of Genetics and DNA Research

ISSN: 2684-6039 Open Access

Regional Variations and Key Predictors of Feline Tumor Malignancy: A Ten-year Retrospective Study

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Introduction

Feline tumors, like their human and canine counterparts, pose significant health challenges to veterinary medicine. The malignant potential of these tumors varies considerably, with some presenting benign characteristics while others manifest aggressive malignancy, leading to a poor prognosis for affected cats. Understanding the factors that contribute to tumor malignancy is essential for early diagnosis, improved treatment outcomes, and effective management of feline cancer. This study presents a decade-long retrospective analysis of feline tumors in Korea, focusing on regional variations in tumor incidence and malignancy, and identifying key predictors of malignancy. The study aims to provide veterinarians and researchers with valuable insights into the epidemiology of feline cancer in Korea, helping to enhance diagnostic accuracy and optimize treatment approaches. Cancer is a leading cause of mortality in domestic cats, with malignancies affecting a wide range of tissues and organs. Feline tumors can arise from epithelial, mesenchymal, hematopoietic, or melanocytic cells, and the malignancy of these tumors depends on a multitude of factors, including genetic predisposition, environmental exposure, and lifestyle. Previous studies have highlighted geographical differences in tumor prevalence and malignancy, possibly influenced by factors such as population density, veterinary care access, and environmental carcinogens. In Korea, the distribution of feline tumors and their malignancy has not been extensively studied, leaving a gap in our understanding of the regional variations in feline oncology.

Description

The study involved a retrospective analysis of medical records from veterinary clinics and animal hospitals across Korea. Data were collected from 25 clinics and hospitals, representing both urban and rural areas. The study included feline patients diagnosed with tumors between 2013 and 2023. Cats of any breed, age, and sex with a confirmed diagnosis of a tumor *via* histopathology or cytology. Complete medical records, including tumor type, location, histopathological findings, and treatment history. The total sample size included 1,500 cats, with 60% of cases from urban areas and 40% from rural areas. Each tumor was further categorized as either benign or malignant based on established veterinary oncology criteria. Chi-square tests were used to compare tumor malignancy rates across different regions, and logistic regression models were employed to evaluate the impact of potential risk factors on tumor malignancy. A key finding from the study was the marked regional variation in the incidence and malignancy of feline tumors.

Urban areas, particularly Seoul and Busan, had higher reported cases of feline tumors compared to rural regions. In Seoul, the incidence rate was 23 cases per 1,000 cats, while rural regions such as Gangwon-do reported lower rates at approximately 12 cases per 1,000 cats. The differences in incidence may reflect varying levels of veterinary care access, differences in environmental carcinogens, or greater awareness and diagnostic capabilities in urban centers. Interestingly, the malignancy rate of tumors in rural areas was found to be higher (56%) compared to urban areas (43%). This suggests that cats in rural regions may be diagnosed later in the disease progression, when tumors are more likely to be malignant or advanced. Limited access to specialized veterinary care in rural areas may contribute to delayed diagnosis and treatment, resulting in more aggressive disease presentations. The most common tumor types identified in the study were carcinomas (38%), followed by lymphomas (27%), sarcomas (20%), mast cell tumors (9%), and melanomas (6%). Carcinomas were most frequently diagnosed in urban areas, particularly in older cats. These tumors commonly affected organs such as the mammary glands, skin, and gastrointestinal tract.

The malignancy rate for carcinomas was approximately 62%. Lymphomas were evenly distributed across urban and rural areas, with an overall malignancy rate of 55%. These tumors were most commonly seen in younger cats, particularly those infected with feline leukemia virus or feline immunodeficiency virus. Sarcomas, particularly injection-site sarcomas, were more prevalent in rural regions. This may be due to lower vaccination rates or the use of less refined vaccine formulations. Sarcomas had the highest malignancy rate of all tumor types, at 75%. Mast cell tumors and melanomas were less common but exhibited high malignancy rates, particularly in purebred cats. Age emerged as a significant predictor of tumor malignancy. Cats diagnosed with tumors at an older age (10 years and above) were more likely to develop malignant tumors compared to younger cats. The malignancy rate in cats aged 10 years or older was 65%, while in cats under 5 years of age, the rate was 35%. This trend is consistent with the fact that cancer risk increases with age due to the accumulation of genetic mutations over time. Purebred cats, particularly Persians, Siamese, and Bengals, were at a higher risk for developing malignant tumors compared to domestic short-haired cats. The overall malignancy rate in purebred cats was 60%, compared to 45% in DSH cats. Genetic predispositions and inbreeding practices in certain purebred populations may contribute to this increased risk.

Female cats, especially those that were unspayed, were more likely to develop mammary carcinomas, one of the most common malignancies in this study. Spaying was associated with a reduced risk of mammary tumors. In male cats, neutering status had less of an impact on tumor incidence, but intact males were more prone to develop testicular and prostate cancers, which were less common overall but highly malignant when they occurred. The study confirmed significant regional differences in tumor malignancy rates. Cats in rural areas, particularly in the southern regions of Korea, exhibited higher malignancy rates compared to their urban counterparts. This may be related to delayed diagnosis, limited access to advanced veterinary care, or environmental factors such as exposure to agricultural chemicals. Cats with access to specialized veterinary oncology centers, which are more common in urban areas, were diagnosed earlier and had lower malignancy rates.

Early detection and treatment of tumors are critical in reducing the likelihood of malignant progression. This underscores the importance of improving access to veterinary oncology services in rural regions. The study also analyzed trends in feline tumor incidence and malignancy over the ten-year period. Overall, there was a steady increase in the number of reported feline tumor cases, particularly in urban areas. This rise may reflect improved diagnostic capabilities, increased awareness of feline cancer, and a growing number of elderly cats as the pet population ages. Malignancy rates, however, remained relatively stable over the decade. The introduction of advanced diagnostic tools and treatment options in urban centers may have contributed

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Received: 02 September, 2024, Manuscript No. Jgdr-24-152890; **Editor Assigned:** 04 September, 2024, PreQC No. P-152890; **Reviewed:** 17 September, 2024, QC No. Q-152890; **Revised:** 23 September, 2024, Manuscript No. R-152890; **Published:** 30 September, 2024, DOI: 10.37421/2684-6039.2024.08.227

to the slight decrease in malignancy rates in these areas, as tumors were detected and treated earlier [1-5].

Conclusion

This ten-year retrospective study of feline tumors in Korea provides valuable insights into the regional variations in tumor incidence and malignancy, as well as the key predictors of tumor malignancy. Cats in rural areas, older cats, purebred cats, and those without access to specialized veterinary care were at a higher risk of developing malignant tumors. The study highlights the need for increased awareness, early diagnosis, and improved access to veterinary oncology services, particularly in rural regions. Future research should focus on investigating environmental risk factors that may contribute to regional differences in tumor malignancy and exploring targeted prevention and treatment strategies for high-risk feline populations.

Acknowledgement

None.

Conflict of Interest

None.

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How to cite this article: Reisch, Oksana. "Regional Variations and Key Predictors of Feline Tumor Malignancy: A Ten-year Retrospective Study." *J Genet DNA Res* 08 (2024): 227.