

A Retrospective Study of Neoplasms in Dogs and Cats Attended at the Veterinary Hospital of the University of Franca

Estudo Retrospectivo de Neoplasias em Cães e Gatos Atendidos no Hospital Veterinário da Universidade de Franca

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Abstract

The aim of this study was to conduct a retrospective analysis of a database created from the histopathological analyses performed on dogs and cats treated at the University of Franca Veterinary Hospital (UNIFRAN), describing the frequencies of different diagnosed neoplasms. For that, a total of 1.312 biopsy cases from animals treated between 2018 and 2021 were reviewed, with 228 corresponding to neoplasms in dogs and 39 to neoplasms in cats. The research used classification data regarding the histogenesis and malignancy of neoplasms. All morphological diagnoses contained in the records were considered, with 297 diagnoses included in the study due to some dogs having more than one pathological process. The study found that neoplasms were more frequent among mixed-breed dogs and cats. For dogs, breast carcinomas represented the most frequent neoplasms (27.33%), with a focus on grade I mixed tumor breast carcinoma (7.42%). For cats, squamous cell carcinoma was the most prevalent neoplasm, accounting for 51.28% of all diagnosed cases. The data generated by retrospective clinical studies like this one are important in updating the frequencies of different neoplasms that can affect domestic animals and determining the possible factors involved in neoplastic processes.

Keywords: Carcinoma. Veterinary Medicine. Oncology. Tumor.

Resumo

Objetivou-se, com o presente estudo, realizar uma análise retrospectiva de um banco de dados criado a partir das análises histopatológicas realizadas em cães e gatos atendidos no Hospital Veterinário da Universidade de Franca (UNIFRAN), descrevendo as frequências das diferentes neoplasias diagnosticadas. Para isso, foram revisados 1.312 casos de biópsias de animais atendidos entre 2018 e 2021, dos quais 228 corresponderam a neoplasias em cães e 39 a neoplasias em gatos. Utilizou-se no estudo dados de classificação referentes à histogênese e à malignidade das neoplasias. Todos os diagnósticos morfológicos constantes nos registros foram considerados. Alguns cães apresentaram mais de um processo patológico, totalizando 297 diagnósticos incluídos na pesquisa. Neste estudo, neoplasias foram mais frequentes entre cães e gatos sem raça definida. Para cães, os carcinomas mamários representaram as neoplasias mais frequentes (27,33%) com destaque para o carcinoma mamário em tumor misto grau I (7,42%). Para gatos, o carcinoma de células escamosas foi a neoplasia mais prevalente do estudo, representando 51,28% do total de casos diagnosticados. Dados gerados por estudos clínicos retrospectivos como o nosso são importantes para atualizar sobre as frequências dos diferentes tipos que podem acometer as espécies domésticas, auxiliando na determinação dos possíveis fatores envolvidos nos processos neoplásicos.

Palavras-chave: Carcinoma. Medicina Veterinária. Oncologia. Tumor.

1 Introduction

In recent decades, dogs and cats have been considered members of families in Brazil due to their positive impact on human life quality. According to a study by Serpell (1991), dog and cat owners experience fewer health problems compared to those without pets. The advantages of having dogs and cats as pets include reduced stress, improved self-esteem, cognitive stimulation, and blood pressure control (BEAVER, 1994).

Concern for the health of dogs and cats has increased, leading to increased life expectancy (BARBOZA *et al.*, 2019; FILGUEIRA *et al.*, 2016). These animals, particularly senior ones, are prone to various diseases, including neoplasms, making research on their prevalence, diagnosis, biological behavior, treatment, and prevention crucial (CRAY, 2020).

Neoplasms are the leading cause of morbidity and mortality among senior dogs and cats (LESTER; GAYNOR, 2000), and the number of diagnoses continues to rise each year (WITHROW, 2007). Neoplasms are genetic diseases caused by changes in DNA, often resulting from damage or changes in gene expression, including changes to fundamental genes involved in cell cycle control or DNA replication and repair mechanisms, as well as exposure to chemical products, carcinogenic viruses, and free radicals. Thus, the variety of neoplasms in dogs and cats may vary based on breed susceptibility, environmental factors, and habits (BARBOZA *et al.*, 2019; BRASILEIRO; PEREIRA; GUIMARÃES, 2012).

A disorganized proliferation of cells is a critical event

in the development of neoplasms, causing the formation of an abnormal mass in one or more tissues or organs (MORRIS; DOBSON, 2007). Neoplasms can be classified based on histogenesis and biological behavior. According to histogenesis, they are divided into epithelial or mesenchymal types, and based on biological behavior, they are classified as benign or malignant (FIGHERA *et al.*, 2008; GILSON; PAGE, 1998). Typically, benign neoplasms are well-defined, non-invasive, and grow slowly, while malignant neoplasms are invasive, metastatic, and grow rapidly. If the neoplasm is epithelial in origin, it is called a “carcinoma,” and if mesenchymal, it is referred to as a “sarcoma” (FIGHERA *et al.*, 2008; GILSON; PAGE, 1998).

The definitive diagnosis of neoplasms is made through histopathological analysis of the lesions. In addition to determining the type of neoplasm, histopathology provides information about the degree of malignancy, which can guide therapeutic decisions and avoid unnecessary surgeries (CAVALCANTI; CASSALI, 2006; DALECK *et al.*, 1998; DALECK; DE NARDI; RODASKY, 2008; RISTOW, 2012; TORIBIO *et al.*, 2012).

In dogs, the most common benign neoplastic categories seem to be cutaneous histiocytoma, lipoma, and adenoma. Regarding highly malignant neoplasms, mast cell tumors and lymphomas are prominent (MORRIS, 2001). In terms of breed predisposition, mast cell tumors seem to mainly affect brachycephalic dogs, while bone neoplasms are more frequent in large and giant breeds (GILSON; PAGE, 1998). In cats, the most common neoplasms include melanoma, squamous cell carcinoma, breast adenocarcinoma, fibrosarcoma, and lymphoma. The incidence of neoplasms in cats can be partially attributed to their high predisposition to feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV), both of which are carcinogenic (SHELTON *et al.*, 1990).

Retrospective or prospective clinical studies on neoplasms in dogs and cats are crucial in characterizing the incidence of different types and determining factors involved in their development (HAYES JUNIOR, 1978; Shida *et al.*, 2010; ROWELL; MCCARTHY; ALVAREZ, 2011; GRAF *et al.*, 2015). This research aims to conduct a retrospective analysis of a database created from histopathological analyses

performed on dogs and cats treated at the Veterinary Hospital of the University of Franca (UNIFRAN). The analysis will describe the frequency of different neoplasms diagnosed and their correlation with breeds.

2 Material and Methods

To create the database for this study, we collected information from the medical records of biopsy results (histopathological analyses) stored at the Histotechnology Laboratory of the UNIFRAN Veterinary Hospital. We analyzed 1.312 cases of biopsies performed on animals between 2018 and 2021, with 228 cases corresponding to neoplasms in dogs and 39 cases corresponding to neoplasms in cats. Our research focused on the classification of histogenesis and malignancy of neoplasms, as well as the animal breeds. All morphological diagnoses recorded in the medical records were considered. Some dogs had more than one pathological condition, resulting in a total of 297 diagnoses included in our study. The frequency of neoplasms in dogs and cats was calculated and compared to the respective breeds.

3 Results and Discussion

Breast carcinomas were the most common type of neoplasms in the study, accounting for 27.33% of cases and comprising the following categories and frequencies: simple breast carcinoma (1.01%), adenosquamous breast carcinoma (0.67%), grade II adenosquamous breast carcinoma (0.34%), anaplastic breast carcinoma with lymphatic invasion (0.67%), grade I papillary cystic breast carcinoma (0.34%), grade I complex breast carcinoma (2.70%), grade II complex breast carcinoma (0.67%), mixed tumor with breast carcinoma (0.67%), grade I mixed tumor with breast carcinoma (7.42%), grade II mixed tumor with breast carcinoma (2.37%), grade I breast carcinoma (0.34%), grade II breast carcinoma (0.67%), grade II solid papillary breast carcinoma (0.34%), grade II solid breast carcinoma (2.7%), tubular breast carcinoma (0.34%), grade I tubular mammary carcinoma (2.7%), grade II tubular breast carcinoma (1.01%), grade I tubulopapillary breast carcinoma (1.35%), grade II tubulopapillary breast carcinoma (0.34%), and in situ tubulopapillary breast carcinoma (0.67%). The relative frequencies of other neoplasms diagnosed in dogs are shown in Table 1.

Table 1 - Canine neoplasms (relative frequencies, %), except breast carcinomas, diagnosed at the Veterinary Hospital of the University of Franca

Adenocarcinoma (0.34%)	mast cell tumor (0.34%)
Breast adenosis (0.34%)	grade I / low mast cell tumor (1.01%)
Complex adenoma (0.67%)	mastocytoma grade i / ii / low (0.34%)
Sebaceous gland adenoma (1.35%)	grade II / high mast cell tumor (0.67%)
Hepatoid gland adenoma (0.34%)	grade II / low mast cell (3.06%)
Meibomian gland adenoma (0.67%)	cutaneous mast cell tumor grade I / low (0.34%)
Mixed apocrine carcinoma (0.67%)	cutaneous mastocytoma grade II / low (1.69%)
Grade II complex carcinoma (1.01%)	cutaneous mast cell tumor grade II / III / high (0.34%)
Mixed apocrine gland carcinoma (0.34%)	metastatic mast cell tumor (0.34%)

Rectal carcinoma in situ (0.34%)	mastocytoma in grade ii mixed tumor (0.34%)
Invasive rectal carcinoma (0.67%)	round cell neoplasm (1.69%)
Carcinoma in grade i mixed tumor (0.67%)	undifferentiated neoplasm compatible with amelanin melanoma (0.34%)
Tubulopapillary carcinoma (0.34%)	bone matrix producing malignant neoplasm (0.34%)
Urothelial carcinoma (0.34%)	osteosarcoma (0.67%)
High-grade urothelial carcinoma (0.34%)	chondroblastic osteosarcoma (0.34%)
High-grade transitional cell urothelial carcinoma (0.34%)	fibroblastic osteosarcoma (0.34%)
Lymphatic carcinomatosis (0.34%)	oral osteosarcoma (0.34%)
Carcinosarcoma (0.67%)	osteoblastic osteosarcoma (0.67%)
Grade II carcinosarcoma (0.67%)	periosteal osteosarcoma (0.34%)
Epidermoid cyst (0.34%)	papilloma (0.34%)
Squamous cell carcinoma (5.74%)	pilomatricoma (0.34%)
Oral squamous cell carcinoma (0.34%)	oral plasmacytoma (0.34%)
Apocrine cyst (0.67%)	sarcoma (0.34%)
Ovarian adenocarcinoma cyst (0.67%)	soft tissue sarcoma (0.34%)
Hepatoid gland epithelioma (0.34%)	grade I soft tissue sarcoma (0.67%)
Sebaceous gland epithelioma (1.01%)	grade II soft tissue sarcoma (2.37%)
Meibonia epithelioma (0.67%)	grade III soft tissue sarcoma (0.67%)
Epulide acanthomatous (1.36%)	cutaneous sarcoma (0.34%)
Fibromatous epulis (0.67%)	breast sarcoma (0.34%)
Ossifying epulis (1.01%)	sertolioma (0.34%)
Breast fibroadenoma (0.34%)	seminoma (2.03%)
Fibroma (1.01%)	benign mixed tumor (1.36%)
Peripheral odontogenic fibroma (0.34%)	grade I mixed tumor (0.34%)
Fibrosarcoma (0.67%)	trichoblastoma (0.34%)
Breast fibrosarcoma (0.34%)	medulloid trichoblastoma (0.34%)
Fibroannexal hamartoma (0.67%)	trabecular trichoblastoma (0.34%)
Cutaneous hemangioma (2.37%)	trichoepithelioma (0.67%)
Hemangiopericytoma (0.34%)	trichofolliculoma (0.34%)
Hemangiosarcoma (1.69%)	tricholemoma (0.67%)
Cutaneous hemangiosarcoma (1.69%)	interstitial cell tumor (0.67%)
Hepatic hemangiosarcoma (0.34%)	neuroendocrine carcinoma (0.34%)
Cutaneous histiocytoma (0.34%)	suggestive: carcinoma - sarcoma (0.67%)
Leiomyoma (0.67%)	
Uterine leiomyoma (0.34%)	
Internal vaginal leiomyoma (0.34%)	
Leydigocytoma (0.34%)	
Leydigoma (0.34%)	
Lymphoma (1.69%)	
Large cell lymphoma (0.34%)	
Diffuse intermediate cell lymphoma (0.34%)	
Lipoma (3.06%)	
Melanocytoma (1.01%)	
Melanoma (1.68%)	
Cutaneous melanoma (0.34%)	
Oral melanoma (1.01%)	
Malignant myoepithelioma (0.34%)	

Source: resource data.

Regarding the breeds of dogs diagnosed with neoplasms, 47.48% were mixed-breeds, 7.57% were poodles, 6.73% were labradors, 5.46% were pitbulls, 3.36% were shitzus, 2.52% were pinschers, 2.52% were German shepherds, 2.52% were fila brasileiros, 2.52% were bassets, 2.10% were boxers, 1.68% were Yorkshires, 1.68% were rottweilers, 1.68% were lhasa apsos, 1.68% were Brazilian terriers, 1.68% were blue

heelers, 1.26% were golden retrievers, 1.26% were cockers, 0.84% were teckels, 0.84% were German dogs, 0.84% were dachshunds, 0.84% were bulldogs, 0.84% were border collies, 0.42% were pugs, 0.42% were German shorthaired pointers, 0.42% were malteses, 0.42% were beagles, and 0.42% were basset hounds. The diagnoses by breed are shown in Table 2.

Table 2 - Neoplasm categories per dog breed, except breast carcinomas, diagnosed at the Veterinary Hospital of the University of Franca

<p>Basset <i>7 diagnoses:</i> 1 tubular mammary carcinoma grade I, 1 tubular mammary carcinoma grade I, 1 complex breast carcinoma grade I, 1 breast carcinoma in grade II mixed tumor, 1 fibroma, 1 undifferentiated neoplasm compatible with amelanic melanoma, 1 malignant myoepithelioma.</p>
<p>Basset hound <i>2 diagnoses:</i> 1 grade II / low mast cell tumor, 1 cutaneous melanoma.</p>
<p>Beagle <i>1 diagnosis:</i> 1 breast carcinoma in grade I mixed tumor.</p>
<p>Blue holler <i>4 diagnoses:</i> 1 acanthomatous epulis, 1 cutaneous mast cell tumor grade II / low, 1 mast cell tumor in grade II mixed tumor, 1 metastatic mast cell tumor.</p>
<p>Border collie <i>2 diagnoses:</i> 1 breast carcinoma, 1 round cell neoplasm.</p>
<p>Boxer <i>8 diagnoses:</i> 1 sebaceous gland adenoma, 1 complex grade I breast carcinoma, 1 cutaneous hemangioma, 1 grade II / high mast cell tumor, 1 grade I / low mast cell tumor, 1 melanocytoma, 1 fibroblastic osteosarcoma, 1 oral osteosarcoma.</p>
<p>Bulldog <i>2 diagnoses:</i> squamous cell carcinomas.</p>
<p>Cocker <i>6 diagnoses:</i> 1 hepatoid gland adenoma, 1 grade I breast carcinoma, 1 squamous cell carcinoma, 1 apocrine cyst, 1 meibomian epithelioma, 1 lipoma.</p>
<p>Dachshund <i>2 diagnoses:</i> 1 oral melanoma, 1 grade II soft tissue sarcoma.</p>
<p>German dog <i>3 diagnoses:</i> 1 sebaceous epithelioma, 1 lymphoma, 1 seminoma.</p>
<p>Fila dog <i>8 diagnoses:</i> 1 fibromatous epulis, 2 cutaneous hemangiomas, 1 mast cell tumor, 2 grade II / low mast cell tumors, 1 papilloma, 1 grade I soft tissue sarcoma.</p>
<p>Brazilian terrier <i>4 diagnoses:</i> 1 meibomian gland adenoma, 1 breast carcinoma in grade I mixed tumor, 1 squamous cell carcinoma, 1 hemangiosarcoma.</p>
<p>Golden retriever <i>3 diagnoses:</i> 1 fibroma, 1 grade II soft tissue sarcoma, 1 grade III soft tissue sarcoma.</p>
<p>Labrador <i>19 diagnoses:</i> 1 breast carcinoma in grade I mixed tumor, 1 solid breast carcinoma grade II, 1 rectal carcinoma in situ, 1 invasive rectal carcinoma, 1 ovarian adenocarcinoma cyst, 1 meibonia epithelioma, 1 epulise ossifying, 1 breast fibrosarcoma, 1 lymphoma, 1 lipoma, 1 cutaneous mast cell tumor grade II / low, 1 grade I / II / low mast cell tumor, 3 grade II / low mast cell tumors, 1 osteosarcoma, 1 periosteal osteosarcoma, 1 oral plasmacytoma, 1 grade II soft tissue sarcoma.</p>
<p>Lhasa apso <i>4 diagnoses:</i> 1 mixed apocrine carcinoma, 1 adenosquamous breast carcinoma, 1 sebaceous epithelioma, 1 soft tissue sarcoma.</p>
<p>Maltese <i>1 diagnosis:</i> 1 oral squamous cell carcinoma.</p>
<p>German shepherd <i>8 diagnoses:</i> 1 complex adenoma, 1 complex breast carcinoma grade I, 2 breast carcinomas in grade I mixed tumor, 1 breast fibroadenoma, 1 fibroma, 1 lipoma, 1 neuroendocrine carcinoma.</p>
<p>German shorthaired pointer <i>1 diagnosis:</i> 1 hepatoid gland epithelioma.</p>

<p>Pinscher 8 diagnoses: 1 complex adenoma, 2 breast carcinomas in grade I mixed tumor, 1 breast carcinoma in grade II mixed tumor, 1 tubular breast carcinoma grade II, 1 carcinoma in grade I mixed tumor, 1 acanthomatous epulis, 1 cutaneous mast cell tumor grade II / low.</p>
<p>Pit bull 17 diagnoses: 4 squamous cell carcinomas, 1 cutaneous hemangioma, 1 hemangiosarcoma, 3 cutaneous hemangiosarcomas, 1 leydigoma, 1 lymphoma, 1 melanoma, 1 high-grade mast cell tumor, 1 cutaneous mast cell tumor grade II / low, 1 cutaneous mast cell tumor grade II / III / high, 1 grade II / low mast cell tumor, 1 seminoma.</p>
<p>Poodle 21 diagnoses: 1 sebaceous adenoma, 1 breast carcinoma, 1 adenosquamous breast carcinoma, 2 breast carcinomas in grade I mixed tumor, 2 breast carcinomas in grade II mixed tumor, 1 solid breast carcinoma grade II, 3 grade I tubular breast carcinomas, 1 grade I tubulopapillary breast carcinoma, 1 sebaceous gland epithelioma, 1 fibromatous epulis, 1 ossifying epulis, 1 leydigocytoma, 1 pilomatricoma, 1 seminoma, 1 benign mixed tumor, 1 medulloid trichoblastoma, 1 interstitial cell tumor.</p>
<p>Pug 1 diagnosis: 1 cutaneous mast cell tumor grade II / low.</p>
<p>Rottweiler 4 diagnoses: 1 bone matrix-producing malignant neoplasm, 1 chondroblastic osteosarcoma, 1 osteoblastic osteosarcoma, 1 seminoma.</p>
<p>Mixed-breed 144 diagnoses: 1 adenocarcinoma, 1 breast adenosis, 2 sebaceous gland adenomas, 1 mixed apocrine carcinoma, 2 grade II complex carcinomas, 1 mixed apocrine gland carcinoma, 1 breast carcinoma, 1 grade II breast carcinoma, 1 grade II adenosquamous carcinoma, 2 anaplastic breast carcinomas with lymphocytic invasion, 1 grade I papillary cystic breast carcinoma, 4 grade I complex breast carcinomas, 2 complex grade II breast carcinomas, 2 breast carcinomas in mixed tumor, 9 breast carcinomas in grade I mixed tumor, 4 breast carcinomas in grade II mixed tumor, 1 solid papillary breast carcinoma grade II, 6 grade II solid breast carcinomas, 1 tubular breast carcinoma, 3 grade I tubular breast carcinomas, 2 grade II tubular breast carcinomas, 2 grade I tubulopapillary breast carcinomas, 1 grade II tubulopapillary breast carcinoma, 1 invasive rectal carcinoma, 1 carcinoma in grade I mixed tumor, 1 tubulopapillary carcinoma, 1 urothelial carcinoma, 1 high-grade urothelial carcinoma, 1 lymphatic carcinomatosis, 2 carcinosarcomas, 2 grade II carcinosarcomas, 8 squamous cell carcinomas, 1 epidermoid cyst, 1 apocrine cyst, 1 ovarian adenocarcinoma cyst, 2 acanthomatous epulises, 1 peripheral odontogenic fibroma, 2 fibrosarcomas, 2 fibroanemial hamartomas, 3 cutaneous hemangiomas, 1 hemangiopericytoma, 3 hemangiosarcomas, 3 cutaneous hemangiosarcomas, 1 cutaneous histiocytoma, 1 hepatic hemangiosarcoma, 1 leiomyoma, 1 uterine leiomyoma, 1 internal vaginal leiomyoma, 2 lymphomas, 6 lipomas, 1 melanocytoma, 4 melanomas, 2 oral melanomas, 1 cutaneous mast cell tumor grade I / low, 2 grade I / low mast cell tumors, 2 grade II / low mast cell tumors, 1 grade II / high mast cell tumor, 4 round cell neoplasms, 1 osteosarcoma, 1 osteoblastic osteosarcoma, 1 sarcoma, 1 breast sarcoma, 1 cutaneous sarcoma, 1 grade I soft tissue sarcoma, 4 grade II soft tissue sarcomas, 1 grade III soft tissue sarcoma, 1 sertolioma, 1 seminoma, 1 suggestive of carcinoma, 1 suggestive of sarcoma, 2 benign mixed tumors, 1 grade I mixed tumor, 1 trichoblastoma, 1 trabecular trichoblastoma, 2 trichoepitheliomas, 1 trichofolliculoma, 2 tricholemoma, 1 interstitial cell tumor.</p>
<p>Shitzu 8 diagnoses: 1 meibomian gland adenoma, 2 breast carcinomas in grade I mixed tumor, 1 high-grade transitional cell urothelial carcinoma, 1 squamous cell carcinoma, 1 leiomyoma, 1 diffuse intermediate cell lymphoma, 1 melanocytoma.</p>
<p>Teckel 2 diagnoses: 1 benign mixed tumor, 1 seminoma.</p>
<p>Yorkshire 7 diagnoses: 1 grade II complex carcinoma, 1 complex breast carcinoma grade I, 1 breast carcinoma in grade I mixed tumor, 1 tubular mammary carcinoma grade I, 1 tubulopapillary breast carcinoma in situ, 1 ossifying epulis, 1 large cell lymphoma.</p>

Source: resource data.

Thirty-eight cats diagnosed with cancer were of mixed-breed, with one being a Siamese breed. Malignant and benign tumors represented 94.87% and 5.13% of the cases respectively. Squamous cell carcinoma was the most prevalent type of tumor, accounting for 51.28% of all cases. 15.38% of the research sample had breast carcinoma, including tubular breast carcinoma with solid areas (grade II, 16.6%), solid breast carcinoma (grade III, 16.6%), tubular mammary carcinoma (grade I, 16.6%), carcinoma in situ (16.6%), and cribriform mammary carcinoma (grade II, 33.3%). Other carcinomas made up 10.25% of the sample and included thyroid carcinoma with metastasis (2.56%), salivary gland

carcinoma (2.56%), ceruminous gland carcinoma (2.56%), and apocrine tubular gland carcinoma (2.56%). Soft tissue sarcoma (grade I) represented 5.13% of the sample, while amelanotic melanoma (2.99%), lipoma (2.99%), hemangiosarcoma (2.99%), lymphoma (5.98%), and round cell neoplasm (2.99%) accounted for 17.96% of the cases.

Advances in veterinary medicine and the longer lifespan of dogs and cats have led to an increased demand for histopathological analysis for a definitive diagnosis of tumors. This is due to the willingness of owners to undergo complementary exams that can help maintain their animal's health, especially in older animals. For science, performing

these tests is crucial, as it contributes to the design of retrospective and prospective clinical studies on the prevalence and incidence of different tumors (BELLEI *et al.*, 2006).

The present study found that tumors were more common in mixed-breed dogs and cats. Mixed-breed animals appear more often in specialized veterinary oncology care in Brazil due to their larger populations compared to purebred dogs (DALECK *et al.*, 1998). Inadequate diets and poor nutrition also play a role in the incidence of tumors. Among dog breeds, poodles, labradors, pit bulls, and dachshunds were the most affected by tumors, supporting the findings of Meirelles *et al.* (2010). In cats, 38 out of the 39 individuals diagnosed with tumors did not have a defined breed, making it impossible to calculate any associations between breed and tumors. Similarly, Patnaik *et al.* (1975), when studying biopsies of 3145 cats, found that purebred cats made up less than 24% of the tumor sample.

Breast carcinomas are a common occurrence in dogs and cats (DALECK *et al.*, 1998), and in this study, they accounted for 27.33% of neoplasms diagnosed in dogs and 15.38% of those diagnosed in cats. While several studies have reported a high prevalence of breast carcinomas, previous research has shown that simple carcinomas are the most prevalent in dogs (DALECK *et al.*, 1998; DE OLIVEIRA *et al.*, 2020; ZUCCARI; SANTANA; ROCHA, 2001), which differs from the results of this study, which showed a higher prevalence of mixed tumors.

This study's findings on dogs are in line with previous literature. For example, De Nardi (2002) found that boxer dogs had 46.15% of developed but cell tumors, which aligns with our results showing a 40% frequency of mast cell tumors for the breed. Our study also confirms that bone neoplasms are more common in large to giant breeds (GOMES *et al.*, 2006). Another canine neoplasm to consider is the melanocytic one, which is most frequently found in mixed-breed dogs. These results are in line with those reported by Teixeira *et al.* (2010) and in this study. These authors reported that melanoma is more frequent than melanocytoma among canine melanocytic neoplasms. Finally, hemangioma and hemangiosarcoma accounted for 6.06% of canine neoplasms, which resembles the findings of Soares *et al.* (2017) who reported 5.93%. Retrospective studies, in general, show that hemangiosarcoma is more frequent than hemangioma (SOARES *et al.*, 2017). In the series by Soares *et al.* (2017), pitbull breed dogs were most affected by hemangiosarcoma/hemangioma, followed by mixed-breed and fila brasileiro breed, which aligns with the findings of this study.

For feline neoplasms, the frequency of squamous cell carcinoma found in the present study was higher than that reported by other authors. In the study by Barbosa *et al.* (2019), squamous cell carcinoma accounted for only 14.4% of the cases. As the cause of these neoplasms is not well understood, it is challenging to determine the factors associated with the high occurrence observed in this study. Daleck, De Nardi and

Rodasky (2008) suggested that chronic exposure to ultraviolet light is linked to this type of neoplasm. However, the data used in the study does not provide information on the cats' habits and living environment. Other types of carcinomas, such as thyroid with metastasis and salivary gland carcinoma, are uncommon in domestic cats, with an incidence of around 2%, which supports the findings of this study with those reported by various authors (BIRCHARD, 2006; GOTTHEIF, 2007; FILGUERA *et al.*, 2016).

Lymphoma accounted for 5.98% of the feline neoplasms in this study, a lower frequency than the 11% reported in a retrospective study by Kimura, Gárate and Dagli (2012). This neoplasm has a clear viral origin, with FIV and FeLV being significant risk factors (CHOY; BRYAN, 2016).

4 Conclusion

This study adds to the existing literature by providing data on various neoplasms in dogs and cats treated at the University of Franca Veterinary Hospital. The database used in the study revealed that neoplasms primarily affected mixed-breed dogs and cats. Additionally, the results indicated that breast carcinoma, particularly mixed tumors, was the most common neoplasm in dogs, while squamous cell tumors were the most common neoplasm in cats.

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