



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; SP-12(12): 900-902  
© 2023 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 14-09-2023

Accepted: 17-10-2023

## P Hima Bindu

MVSc, Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, India

## B Prakash Kumar

Assistant Professor and Head, Department of Veterinary Surgery and Radiology, College of Veterinary Science, Garividi, Andhra Pradesh, India

## V Devi Prasad

Professor and Head, Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, India

## B Chandra Prasad

Assistant Professor, Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, India

## Corresponding Author:

### P Hima Bindu

MVSc, Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, India

## Incidence of mammary tumors in dogs: A review of 20 cases

P Hima Bindu, B Prakash Kumar, V Devi Prasad and B Chandra Prasad

### Abstract

The present study was carried out to investigate the incidence of mammary tumors in bitches. Among the 20 cases studied, the highest incidence (55%) occurred in dogs above 10 years old, with the Spitz breed being the most susceptible (55%). The tumors exhibited diverse sizes, ranging from 30 mm to 450 mm, and were predominantly hard, nodular, and non-pedunculated. Clinical examination revealed gland-wise occurrences, with 50% of cases affecting the right mammary gland chain. Fine needle aspiration cytology identified mammary carcinoma in 90% of cases, with one case each of adenoma and lipoma.

**Keywords:** Nodular, incidence, non-pedunculated

### Introduction

Management of Mammary gland tumor in bitches has become a significant global challenge frequently encountered by veterinarians. These are the second most common type of tumor in female dogs, following skin tumors, with an incidence rate of approximately 3.4% (Kustritz, 2007) [9] and the prevalence is nearly three times higher than that of breast cancer in women (Kahn and Line, 2010) [5]. Canine Mammary Tumors tend to develop spontaneously (Rivera *et al.* 2009) [19] and are more common in middle-aged intact female dogs. Invasive techniques like cytology and histopathology are typically used to provide an early diagnosis of malignant tumors due to their certainty in tumors diagnosis.

### Materials and Methods

The present study was undertaken on mammary gland tumors that were presented to the department of veterinary surgery and radiology, NTR College of Veterinary Science, Gannavaram. The data regarding the incidence of mammary tumors were collected i.e. age, breed, involvement of gland, size, consistency and external consistency, staging of tumors, were recorded and analyzed.

### Results

A total of 20 cases with mammary tumors were presented to the Department of Veterinary Surgery and Radiology, NTR college of veterinary science, Gannavaram and the results of the study were as follows.

#### 1. Age-wise incidence

In the present study, the highest incidence of mammary tumors was observed within the age group of above 10 years, accounting for 55% (n = 11) of the cases, followed by the age group of 5-10 years with a 35% (n = 7) incidence, and the age group of below 5 years, which had a 10% (n = 2) incidence. Conversely, the lowest incidence was recorded in the age group of below 5 years, where only 10% of cases were reported.

#### 2. Breed-wise incidence

Among 20 cases that were reported, incidence was found in five distinct dog breeds, namely Spitz (n=11), Saint Bernard (n=1), Dachshund (n=2), German shepherd (n=2), and Mongrel (n=4). The Spitz breed exhibited the highest incidence at 55%, making it the most susceptible breed. Mongrel dogs had the second-highest incidence, representing 20% of the reported cases. German shepherds and Dachshunds both displayed a 10% incidence, while Saint Bernard had the lowest incidence, with only 5% of cases.

### 3. Size

There is a wide variation observed in the size of the tumor among the 20 cases that were reported. The largest tumor measured about 450x196x89 mm and the smallest tumor measured about 30x72x40 mm. Further in case no. 17, multiple growths were observed on the entire mammary chain.

### 4. Consistency and external appearance

All the tumors in the present study were palpated and found to be hard in consistency. The external appearance of the tumors was found to be nodular and all were non-pedunculated. Out of 20 cases, 60% cases (n=12) were found to be nodular and 40% cases (n=8) were ulcerated.

### 5. Involvement of glands

In the present study, gland-wise occurrence of canine mammary neoplasm was studied in 20 cases in which 50% (n=10) of cases exhibited neoplasms in the right chain of mammary glands, while 35% (n=7) showed neoplasms in the left mammary gland chain. Interestingly, in 15% of cases (n=3, case no. 7, 10, and 17), both chains of mammary glands were affected. Further, out of the 20 dogs, 85% of cases (n=17) presented with neoplastic involvement in a single gland, 10% (n=2) displayed involvement in two glands, and in 5% (n=1, case no. 17), all the glands were affected. The most commonly affected glands were the inguinal mammary glands (50%, n=9), with 3 cases in the right inguinal gland and 4 cases in the left inguinal gland. Additionally, 15% (n=3) had neoplasms in the caudal abdominal glands, with 2 cases in the right and 1 case in the left. Another 15% (n=3) showed involvement in cranial abdominal glands, with 2 cases in the right and 1 case in the left. Finally, 10% (n=2) had neoplastic involvement in the right caudal thoracic mammary glands, and 10% (n=2) in the cranial thoracic mammary glands, including 1 case in the right and 1 case in the left cranial thoracic mammary gland.

### 6. Staging of canine mammary tumors

In the current study of mammary tumors (CMT), 20 cases were examined and classified using the modified WHO staging system (TNM Classification) for CMT, which aids in evaluating the disease's severity and progression to inform treatment and prognosis. The findings revealed that the vast majority of these cases, specifically 18 out of the 20, were categorized as Stage V malignancies, accounting for 90% of the cases. This stage signifies an advanced and potentially more aggressive form of the disease. In contrast, Stage I and Stage II were only observed in one case each, collectively making up 5% of the total cases. In essence, the study's results highlight that a significant proportion, 90%, of the CMT cases analyzed were already in an advanced stage, specifically Stage V, which typically indicates a poorer prognosis.

### Discussion

In the present study, the age of female dogs with mammary gland tumours varied, with the youngest affected dog being 4 years old and the oldest 15 years old. The median age of the animals with mammary gland issues was approximately 10 years. Earlier research, such as that by Ezerskyte *et al.* (2011)<sup>[3]</sup>, has similarly reported a median age of around 9.9 years in dogs suffering from canine mammary tumours. Other studies, such as those by Murphy in 2008<sup>[14]</sup> and Kishor *et al.* (2016)<sup>[7]</sup> have indicated that mammary tumours tend to be more

common in older female dogs, typically around 10 to 11 years of age, while they are rare in dogs less than 2 years old.

It's notable that the Spitz breed consistently displayed a high incidence in the present study and was also reported as highly susceptible in Khare (2000)<sup>[6]</sup> and Shivani (2007)<sup>[21]</sup>, suggesting that Spitz dogs may indeed have an elevated risk of mammary tumours. Similarly, Dobermans were identified as a breed of concern in multiple studies, including the present study, Khare (2000)<sup>[6]</sup>, Nayyar (2002)<sup>[16]</sup>, and Shivani (2007)<sup>[21]</sup>, underscoring a potential predisposition to these tumors. German Shepherds also appeared to be at risk in various studies, as reported in Nayyar (2002)<sup>[16]</sup>, Bala (2005)<sup>[2]</sup>, and Nadhiya *et al.* (2018)<sup>[15]</sup>, further emphasizing their susceptibility. Dachshunds displayed moderate incidence in the present study and were also noted in Nayyar (2002)<sup>[16]</sup> studies reinforcing their potential risk.

A comparison of present study on canine mammary tumours with various other studies reveals notable trends in the size, characteristics, and gland-wise occurrence of these neoplasms. In the present study, wide variation in tumour size among the 20 reported cases was observed with the largest tumour measuring about 450 mm in length and the smallest about 30 mm. Among the cases, 60% (n=12) were nodular and non-pedunculated, while 40% (n=8) were ulcerated and non-pedunculated. Among the glands that were affected, the most commonly involved pair was the inguinal mammary glands (50%), followed by the caudal abdominal mammary glands (15%), cranial abdominal glands (15%), caudal thoracic mammary glands (10%), and cranial thoracic mammary glands (10%). These findings align with a range of other studies, including those by Moulton *et al.* (1970)<sup>[12]</sup>, Mitchell *et al.* (1974)<sup>[11]</sup>, and Mulligan (1975)<sup>[13]</sup>, who collectively reported a higher frequency of mammary tumours occurring in the caudal abdominal and inguinal glands. These studies also observed the involvement of multiple glands in a substantial proportion of cases (37%). Similarly, Rekha (2007)<sup>[18]</sup>, Leena (2008)<sup>[10]</sup>, and Kumar *et al.* (2011)<sup>[8]</sup> documented an increasing incidence of mammary tumours from the cranial thoracic glands to the final pair of inguinal glands, with the inguinal glands consistently showing the highest occurrence, contributing significantly to the total cases (ranging from 34.17% to 61.97%). Hemanth *et al.* (2015)<sup>[4]</sup> emphasized that mammary tumours could manifest in all mammary glands, singly or in combination, with a notable predilection for the inguinal pair. Ariyaratna *et al.* (2018)<sup>[1]</sup> also noticed that a majority of dogs presented with tumours in a single mammary gland (71.6%), while 28.3% had tumours affecting multiple mammary glands, with the inguinal glands being a common site of involvement.

Following surgical excision, the tumours were graded. Notably, their findings revealed that Stage I tumours were the most prevalent, constituting 31.75% of cases, followed by Stages II, III, IV, and V. Moreover, they observed that animals with histological grade I carcinomas were more likely to present with earlier stages (Stage I, II, or III) and less likely to have advanced stages (Stage IV and V) of mammary tumours, suggesting a correlation between histological grade and clinical stage. Nunes *et al.* (2018)<sup>[17]</sup> reported that 83% of dogs with mammary tumours exhibited early clinical staging (Stage I to III), while 17% were diagnosed with advanced clinical stage (Stage IV and V) tumours. This reinforces the importance of early detection and timely intervention, underscoring that the negligence of dog owners in recognizing the early signs and seeking medical attention might contribute

to the higher incidence of advanced-stage tumours (Stage IV or V). This observation is consistent with Sharma *et al.* (2017)<sup>[20]</sup>, who noted that dog owners often ignore small growths and delay seeking treatment until the tumours have grown substantially or become painful for the animals. The increase in tumour size is associated with the progression toward malignancy and the attainment of higher invasive and metastatic potential, as supported by research from Sorenmo *et al.* (2009)<sup>[22]</sup> and Sharma (2017)<sup>[20]</sup>.

## References

1. Ariyaratna H, De Silva N, Aberdein D, Kodikara D, Jayasinghe M, Adikari R, *et al.* Clinicopathological diversity of canine mammary gland tumors in Sri Lanka: A one-year survey on cases presented to two veterinary practices. *Veterinary Sciences*. 2018;5(2):46.
2. Bala M. Clinical studies on the evaluation of doxorubicin as an adjuvant chemotherapy for the management of canine mammary neoplasms. M. V. Sc. Thesis, Punjab Agricultural University, Ludhiana, 2005.
3. Ezerskyte A, Zamokas G, Grigonis A, Juodziukyniene N. The retrospective analysis of mammary tumors in dogs. *Veterinaria Medicina Zootecnica*. 2011;53(75):3-8.
4. Hemanth I, Kumar R, Varshney KC, Nair MG, Kumar BR, Sivakumar M, *et al.* Epidemiological and clinical studies on canine mammary tumors. *Indian Journal of Veterinary Research The*. 2015;24(1):11-14.
5. Kahn CM, Line S. *The Merk Veterinary Manual*. 10th Edn. Merk and Co, Inc. New Jersey. USA, 2010.
6. Khare YB. A study on canine mammary gland neoplasia and its surgical management. Unpublished M. V. Sc. Thesis submitted to the Konkan Krishi Vidyapeeth, Dapoli, 2000.
7. Kishor TK, Rao S, Satyanarayana ML, Narayanaswamy HD, Byregowda S, Nagaraja BN, *et al.* Classification and staging of canine mammary gland tumors. *Journal of Cell and Tissue Research*. 2016;16(3):5787-92.
8. Kumar KRA, Rao GVS, Balachandra NC. Incidence, cytology, gross pathology and histopathology of mammary tumors in dogs of Chennai. *International Journal of Pharmacology and Biological Sciences*. 2011;2(3):B399-405.
9. Kustritz MVR. Determining the optimal age for gonadectomy of dogs and cats. *Journal of the American Veterinary Medical Association*. 2007;231(11):1665-1675.
10. Leena RPL. A study on gross, histopathology and immunohistochemistry of canine mammary tumors. M.V. Sc. Thesis, Pondicherry University, Puducherry, 2008.
11. Mitchell L, Iglesia DLFA, Wenkoff MS, Van Dreumel AA, Lumb G. Mammary tumors in dogs: survey of clinical and pathological characteristics. *The Canadian Veterinary Journal*. 1974;15(5):131.
12. Moulton JE, Taylor DON, Dorn CR, Andersen AC. Canine mammary tumors. *Pathologia veterinaria*. 1970;7(4):289-320.
13. Mulligan RM. Mammary cancer in the dog: A study of 120 cases. *American Journal of Veterinary Research*. 1975;36:1391-96.
14. Murphy S. Mammary tumors in dogs and cats. *In Practice* 2008;30(6):334-39.
15. Nadhiya C, Nair MG, Kumar R, Lakkawar AW, Uma S, Alphonse RMD. A study on the occurrence of mammary neoplasms in dogs at Puducherry, India; c2018.
16. Nayyar A. Evaluation of Vinblastine and Mitomycin in conjugation with surgery in canine mammary neoplasms M. V. Sc Thesis, Punjab Agricultural University, Ludhiana, 2002.
17. Nunes FC, Campos CB, Teixeira SV, Bertagnolli AC, Lavalle GE, Cassali GD. Epidemiological, clinical and pathological evaluation of overall survival in canines with mammary neoplasms. *Arquivo Brasileiro de Medicina Veterinaria e Zootecnia*. 2018;70(6):1714-1722.
18. Rekha MT. Pathology of canine mammary tumors and usefulness of AgNOR in differentiating benign and malignant mammary tumors. M. V. Sc. Thesis, Anand Agricultural University, Anand, Gujarat, 2007.
19. Rivera P, Melin M, Biagi T, Fall T, Haggstrom J. Mammary tumor development in dogs is associated with BRCA1 and BRCA2. *Cancer Research*. 2009;69:8770-8774.
20. Sharma S. Comparison of cytologic immunohistologic and molecular methods for the diagnosis and prognosis of canine mammary tumors. M. V. Sc Thesis, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India, 2017.
21. Shivani. Cytopathology of canine mammary gland affections with special reference to mammary gland tumors M. V. Sc Thesis, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India, 2007.
22. Sorenmo KU, Kristiansen VM, Cofone MA, Shofer FS. Canine mammary gland tumours- a histological continuum from benign to malignant; clinical and histopathological evidence, Blackwell Publishing Ltd, Veterinary and Comparative Oncology. 2009;7(3):162-172.