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Canine mammary gland tumours: An incidence

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Abstract
The present study was undertaken with objective to record the incidence of canine mammary gland tumours in dog presented at Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Anand during the period of July 2023 to July 2024. A total of 111 cases of different neoplastic conditions were recorded during the period of July 2023 to July 2024, out of these cases, 38 cases were diagnosed as canine mammary gland tumours. Among them, 27 clinical cases referred to the Department of Veterinary Surgery and Radiology, Anand for further investigation. Among them, highest frequency of mammary gland tumours was observed in 8 to 12 years of age groups. Amongst the breeds, highest number of mammary gland tumours was observed in Labrador Retriever. Inguinal pair of mammary gland found most commonly affected.

Keywords: Canine mammary gland tumours, incidence, inguinal pair, labrador retriever

Introduction
A neoplasm (Neo-new, plasm-growth or formation) refers to an uncontrolled new tissue growth. It serves no functional purpose and lacks of structural organization. Compared to humans, canine neoplasms are observed more frequently and are a significant cause of death in dogs (Bhanderi *et al*., 2022) [2]. Mammary gland tumours are the second most common tumours in dogs. Mammary gland tumours are more common in unspayed and middle-aged bitches and between 8 to 10 years of age groups dogs are more commonly affected by mammary gland tumours. Mammary gland tumours rarely occurred in male dogs. The present study was aimed to know incidence of canine mammary tumour regarding age, breeds, sex, involvement of mammary gland, reproductive status of canine patients.

Materials and Methods
This study was conducted on 27 clinical cases of Canine Mammary Gland Tumours (CMGT) that were presented for surgical management at the Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Anand, between July 2023 to July 2024. To assess the epidemiological characteristics of mammary gland tumours, data on breed, age (categorized as 0 to < 4 years, > 4 to < 8 years, > 8 to < 12 years, and above 12 years), sex (male and female), and reproductive history, including neutering and pseudopregnancy, were also gathered and analyzed.

Results and Discussion
Overall Incidence
Total 111 cases of various neoplastic conditions were reported between July 2023 to July 2024 at the Veterinary Clinical Complex, Kamdhenu University, Anand. Of these, 38 cases (34.23%) were diagnosed as canine mammary gland tumours. 27 of these cases were referred to the Department of Veterinary Surgery and Radiology, Anand for further investigation.

Age Wise Incidence
Among the 27 dogs diagnosed with mammary gland tumours, the highest incidence was observed in the 8 to 12 years age group, accounting for 18 cases (66.66%) (Table 1). This was followed by the 4 to 8 years group with 5 cases (18.52%), the over 12 years group with 3 cases (11.11%), and the under 4 years group with 1 case (3.70%). Similar findings have been reported by Silva *et al*. (2019) [12] and Bhimani *et al*. (2024) [3] all of whom observed that the highest frequency of canine mammary gland tumours occurs in dogs aged between 8 and 12

years, with fewer cases in those under 4 years or over 12 years. Witsch *et al*. (2010) [15] explained that aging increases the likelihood of genetic mutations and the accumulation of tumour-promoting factors, raising the probability of mammary gland tumour development in older dogs.

Table 1: Age wise incidence

Age (years)	Number of cases	Percentage (%)
0 to 4	1	3.70
4 to 8	5	18.52
8 to 12	18	66.66
Above 12	3	11.11
Total	27	100

Breed Wise Incidence

Among the 27 cases of canine mammary tumours, the highest occurrence was noted in Labrador Retrievers, with 11 cases (40.74%) (Table 2). This was followed by 4 cases each in Mongrels (14.81%) and Pomeranians (14.81%). Rottweilers, German Shepherds, and Great Danes were each affected by 2 cases (7.41% per breed), while 1 case was observed in both Golden Retriever (3.70%) and Dachshund (3.70%). Recent studies by Mondal *et al*. (2023) [8] and Sruthi *et al*. (2024) [14] indicated that the Labrador Retriever had the highest incidence of mammary tumours.

These findings suggest that pet owners tend to favor specific breeds based on their popularity in a given region. As a result, the distribution of breeds across different geographical areas varies, which in turn influences the variation in the incidence of various disorders, including mammary gland tumours.

Table 2: Breed wise incidence

Sr. No.	Breed	Total	
		Number of cases	Percentage (%)
1	Labrador Retriever	11	40.74
2	Mongrel	4	14.81
3	Pomeranian	4	14.81
4	Rottweiler	2	7.41
5	German Shepherd	2	7.41
6	Great Dane	2	7.41
7	Golden Retriever	1	3.70
8	Dachshund	1	3.70
	Total	27	100

Sex Wise Incidence

In the current study, all cases of canine mammary gland tumours were found in female dogs. This aligns with the findings of Arshi (2016) [1], who also reported that every instance of mammary gland tumours occurred in female dogs, with no cases observed in males. Similarly, Dileepkumar *et al*. (2014) [4], and Patel *et al*. (2019) [10] noted that mammary gland tumours in male dogs are extremely rare. Sorenmo *et al*. (2000) [13] suggested that female sex hormones may cause certain breast cells to lose their ability to regulate growth, increasing the likelihood of mutations and malignant transformation, which predispose female dogs to the development of mammary gland tumours.

Incidence According to Site of Occurrence

A total of 41 mammary tumour masses were collected from 27 cases of canine mammary gland tumours. Of these, 9 cases (33.33%) involved a single gland, another 9 cases (33.33%) involved two glands, and the remaining 9 cases (33.33%) had more than three glands affected (Table 3). The highest incidence was seen in the inguinal gland, with 21 cases (51.22%), followed by the caudal abdominal glands with 13 cases (31.71%), cranial abdominal glands with 4 cases (9.76%), caudal thoracic glands with 2 cases (4.88%), and the lowest incidence was in the cranial thoracic glands, affecting only 1 case (2.44%). Additionally, mammary gland tumours involvement was more common on the left side (65.85%) compared to the right side (34.15%), with 9 cases involving both sides. These findings are consistent with previous studies by Dileepkumar *et al*. (2014) [4], Arshi (2016) [1] and Bhimani *et al*. (2024) [3].

Gomez *et al*. (2012) [6] suggested that the higher susceptibility to mammary gland tumours in the caudal abdominal and inguinal mammary glands could be attributed to their vascular and lymphatic drainage. According to Rutteman *et al*. (2000) [11] the inguinal mammary glands are more prone to trauma, making them the most frequently affected by tumours compared to other mammary gland pairs.

Table 3: Site distribution of canine mammary tumours in different breeds of dogs

Sr. No.	Gland affected	No. of tumour mass	Percentage (%)
1	Cranial thoracic (1st pair)	1	2.44
2	Caudal thoracic (2nd pair)	2	4.88
3	Cranial abdominal (3rd pair)	4	9.76
4	Caudal abdominal (4th pair)	13	31.71
5	Inguinal (5th pair)	21	51.22
	Total	41	100

Reproductive Status of Patients

It was found that out of 27 cases, only 2 dogs (7.41%) were neutered, while the remaining 25 (92.59%) were intact. One neutered Labrador Retriever was spayed at 6 years old, one year before developing a mammary tumour, and a neutered Great Dane was spayed at 4 years old, three years prior to tumour onset. These findings align with previous studies by Bhimani *et al*. (2024) [3] and Sruthi *et al*. (2024) [14], who reported a higher incidence of mammary gland tumours in intact dogs compared to spayed ones. Panchkhande *et al*. (2019) [9] suggested that intact females are at greater risk of developing mammary gland tumours due to the hormonal dependency of proliferating neoplastic cells. Misdrop (1988) [7] noted that spaying at an older age increases the risk of neoplasia, with no protective effect after the fourth oestrous cycle.

Out of 27 cases, one German Shepherd (3.70%) exhibited clinical signs of pseudopregnancy. The dog's history revealed that after its mammary glands enlarged, milk was being secreted without any whelping or signs of pregnancy. These symptoms occurred five months before the development of mammary gland tumours. The remaining 26 cases (96.30%) had no history of pseudopregnancy. Gobello *et al*. (2001) [5] suggested that the formation of mammary gland tumours in cases of pseudopregnancy may result from the continuous mechanical stretching of glandular tissue and the accumulation of carcinogenic substances within the mammary acini due to milk production and retention.

Conclusion

Canine mammary gland tumours were found more frequently in the age group of 8 to 12 years with Labrador

Retrievers was commonly affected breeds. Intact bitches were prone to development of mammary gland tumours. The inguinal pair of mammary glands were more prone to development of mammary tumours with increasing frequency from cranial thoracic gland to inguinal pair of mammary glands.

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