The Pharma Innovation

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Assessment of risk factors for incidence of canine mammary tumors

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Abstract
A clinical study was carried out on 20 female canine patients who were attended at the Surgery Service of the Veterinary Hospital of the SVVU (Visakhapatnam), during a period of 6 months. This study aims to assess the risk factors relating to the incidence of mammary tumor in canine by taking some signalments into consideration *viz.*, age, breed, sex, general body condition etc. Clinical observations like nature of growth, Glands affected and number of glands affected was also considered. Purebred dogs were more likely than mixed breed dogs to suffer from mammary tumors, with these tumors being more frequently malignant. It was also found that large-sized patients show a greater predisposition to malignant mammary tumors. The crux of the case study is, the dogs fed on homemade food are more prone to the mammary tumors than those fed with commercial pet foods. In patients with tumors, age at diagnosis was significantly associated with a higher malignancy rate. Mammary tumors represent the most frequently diagnosed neoplasia in female dogs.

Keywords: dog, malignancy, mammary tumor, obesity, risk factor

Introduction
The incidence of cancer continues to increase worldwide both in humans and companion animals. Despite the seriousness of this process and the large number of studies performed, current medical research in this area continues to be hampered by the complexity of cancer biology (Pinho *et al.,* 2012) [6]. The studies of spontaneous neoplasia in companion animals, particularly in canine species, provides useful information in the research on comparative epidemiology, pathogenesis, and therapeutics, since dogs have a shorter lifespan and develop tumors similar to those diagnosed in humans regarding both morphological and biological behaviour (Marconato *et al.,* 2009) [4].

Mammary tumor is a compound tubular alveolar gland divided into lobules by interlobular connective tissue. The mammary gland consists of parenchyma (alveoli), stroma (connective tissue), ducts, vessels and nerves. Bitches usually have five pairs of glands. Cranial two pairs are referred as cranial and caudal thoracic mammary glands, middle two pairs are called as cranial and caudal abdominal gland, caudal pair is referred to as Inguinal mammary glands. After the skin, mammary gland is the second most common site for tumor development in dogs. Mammary tumors are one of the most common neoplasms in female dogs (Rivera and von Euler, 2011) [7]. Dogs are the most frequently affected species with tumors among the domestic species. Mammary tumors are common among the older female patient, they are very rare in the males. 50% of all the tumors in bitch are mammary tumors. 45% of mammary tumors are malignant in dogs. If the bitches are not treated in time, it may result in mortality. Incidence of mammary tumor can be reduced to 0.8% if spayed before first heat. The action of ovarian hormones (estrogens and progesterone) on mammary gland tissue during different stages of development is a risk factor associated with the development of mammary tumors. A preventive effect of spaying on the development of mammary tumors has been reported. Early ovariectomy in dogs and cats has a protective effect against both benign and malignant mammary tumors. The risk of developing a mammary tumor increases as the number of estrous cycles increases. The risk of developing mammary gland tumors is 0.05% if the bitch is spayed prior to the first estrous cycle (Salas *et al.,* 2015) [8]. The aim of the case study is to assess the risk factors relating to the incidence of mammary tumor in canine by taking some signalments into consideration *viz.*, age, breed, sex, general body condition and food.

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Materials and Methods
The study included 20 cases of canine mammary neoplasms presented to Veterinary Poly Clinic, Visakhapatnam for treatment. Different clinical parameters like signalment, general body condition, reproductive history, duration of clinical signs, number of mammary glands involved, location, size, consistency and attachment of tumorous mass, any discharge or nipple deformity, mode of growth, any treatment given earlier, distant metastasis etc. were recorded on the day of presentation. The Body condition score of the animals were assessed on basis of 5 point scale. Information regarding the pet management practices was also simultaneously collected along with anamnesis. Hematological parameters analysis was carried out at Animal Disease Diagnostic Laboratory, Visakhapatnam, Government of Andhra Pradesh.

Results
The results obtained in the case study were tabulated and presented as follows

Breed: Out of 20 cases.
a. Dachshund - 8 (40%)
b. Pomeranian - 5 (25%)
c. German shepherd - 4 (20%)
d. Mixed breed - 3 (15%)

Sex: All the reported cases are females.
Age: Two age groups were considered for study based on the reported cases

Table 1: Grouping of animals based on age

S. No	Group	Age	No. of cases
1	Group-I	9-11 ears	17
2	Group-II	12-13 years	03

General body condition
The general body condition of animal is determined on the basis of Body Condition Score (BCS-5 point scale).

Table 2: BCS score of presented cases

S. No.	Body condition score	General condition	No. of animals
1.	BCS-1	Very thin	0
2.	BCS-2	Thin	0
3.	BCS-3	Ideal	2
4.	BCS-4	Over weight	7
5.	BCS-5	Obese	11

Feeding habits and history
Three different kinds of feeding habits were indentified *viz.*, commercial pet foods alone, Homemade foods alone, both commercial & Homemade foods.

Table 3: Feeding habits

S. No.	Type of food	Results
1	Homemade foods	13
2	Commercial pet foods	7

Remarks: Homemade food is recognized as one of the risk factor for mammary tumor incidence which predisposes obesity resulting in mammary tumor.

Reproductive status
All the dogs reported are Unspayed, which can be considered as primary cause of hormonal imbalance.

Rate of growth
The rate of growth is Very slow/Slow/Fast.

Table 4: Rate of growth

S. No.	Rate of growth	Results
1	Very slow	2
2	Slow	13
3	Fast	5

Mode of growth
In all the cases the growth is observed in expansive mode.

Size of tumor
Two classes of tumors were identified based on the size.

Table 5: Size of tumor

S. No.	Group	Size	No. of cases
1.	Group-I	1-2.5 cms	04
2.	Group-II	2.5- 5 cms	16

Consistency
Mostly the tumor is hard in consistency and in few cases the tumor is firm (2 cases).

Location

Table 6: Location

S. No.	Location of gland	No. of animals
1	Cranial thoracic	0
2	Caudal thoracic	0
3	Cranial abdominal	2
4	Caudal abdominal	7
5	Inguinal	11

Number of glands affected
Most of the cases mammary tumor is solidary in nature and only one gland is affected. Involvement of both pairs is noticed very few cases.

Pedunculated/unpedunculated
The mammary tumors are both pedunculated and unpedunculated in nature

Nipple deformities and teat discharges
Nipple deformities and teat discharges are observed in minor number of cases.

Hemotological parameters
Hematological parameters are quiet normal in most of the cases, liver dysfunction is observed in the geriatric dogs.

Discussion
In this case study the dogs presented were all females and unspayed, predominantly of the age group 9-11 years. The general body condition of the animals is based on the Body Condition Score (BCS 5 point scale) of the dogs. Most of the dogs presented were of category BCS-4 (overweight) and BCS-5 (Obese) from which we can interpret that the obesity is one of the risk factors for mammary tumor. These results are agree with the findings of many authors (Sonnenschein *et al.,* 1991; Itoh *et al.,* 2005; Salas *et al.,* 2015) [2, 8, 9].

Among the cases presented the animals were of Dachshund, Pomeranian, German shepherd and Mixed breed in the decreasing order of incidence. The evidence for the increased frequency of purebred dogs that suffer from mammary tumors (85%) is consistent with the findings of several studies (Perez Alenza *et al.,* 2000; Egenvall *et al.,* 2005; Vascellari *et al.,* 2016) [1, 5, 10]. The most peculiar finding found the case study is, the dogs fed on homemade food are more prone to the mammary tumors than those fed with commercial pet foods. This may be attributed to the unbalanced homemade diet which is rich in fats fed at home predisposing obesity.

The rate of growth is very slow in most of the cases. The mammary tumors are grown in expansive mode with an average size of mammary tumor about 2.5-5cms. (Note: The broadest diameter is considered). The tumor in all cases is hard in consistency with well-defined borders.

The location of the gland affected glands is mostly caudal abdominal and inguinal. Mostly a single gland is affected and tumor is solidary in nature. Most of the times the tumor is pedunculated in nature. The nipple deformities and discharges from teats are noticed in minor number of cases.

The hematological parameters are quiet normal in most of the cases except in dogs of more than 12 years of age where the liver dysfunction is noticed (Mac Vean *et al.,* 1978) [3]. Such dogs were treated with medications which improve the function of liver and then reexamination was done before proceeding to surgery.

Conclusion
Old age, purebred and large size (Obesity) predisposes to its development and represents risk factors for malignancy. The dogs fed on homemade food are more prone to the mammary tumors than those fed with commercial pet foods, may be due to the unbalanced homemade diet which is rich in fat feed at home predisposing obesity causes more incidence of canine mammary tumor.

Acknowledgments

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