

Occurrence of neoplasms in canine – a retrospective study

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ABSTRACT

The occurrence of canine neoplasms was recorded in dogs during the period April 2001–March 2007. Among 403 cases of neoplasms 42.93% cases of canine transmissible venereal tumour (CTVT) were recorded followed by mammary gland tumours (33.50%) and skin and other tumours (23.57%). Among different breeds of dogs, Spitz, Mongrel and German shepherd were found more susceptible. In general, more cases were recorded in females (70.72%) than that in males (29.28%) however, in case of skin and other tumours more cases were recorded in males (65.26%) than in females (34.74%). Other dogs were more susceptible for neoplasia except CTVT cases.

Key words: Cancer, Canine, Neoplasms

Of all species, dogs develop neoplasms twice as frequently as humans (Moulton 1999), with incidence of skin and mammary tumours being the highest (Rungsipat *et al.* 2003, Maiti 2004).

Data on incidence rates are relatively new development in the veterinary medicine. One of the major sources of various dog neoplasm incidence rates has been a population based animal tumour registry (Schneider 1975). Though, majority of epidemiological studies had been reported from various countries, in India knowledge about epidemiology of canine neoplasms is scant.

MATERIALS AND METHODS

In this study, all the cases of canine neoplasms reported for treatment at referral veterinary polyclinic, Indian Veterinary Research Institute (IVRI), Izatnagar, during the period of 6 years (1st April 2001–31st March 2007) were analyzed based on the clinical history sheets. Based on the survey, the occurrence of canine neoplasms was recorded and analyzed with respect to the number and percentage of different types of neoplasms, age, sex, breed of animals, season and geographic region were conducted.

RESULTS AND DISCUSSION

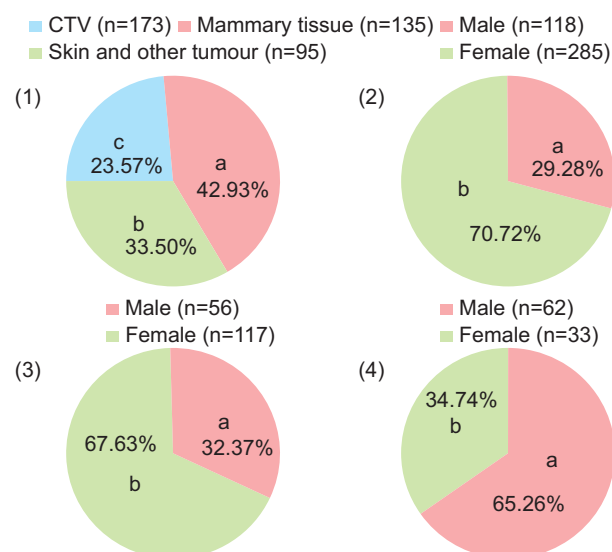
Occurrence of different neoplasms in canines: Significantly ($P < 0.05$) more cases of canine transmissible venereal tumour (CTVT) were recorded (42.93%) followed

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by mammary gland tumours (33.50%) and skin and other tumours (23.57%).

Sex-wise occurrence: Significantly ($P < 0.01$) more number of cases were recorded in females 285 (70.72%) than in males 118 (29.28%).



Figs 1–4. 1. Occurrence of different types of neoplasms in canines. Different alphabets are showing significant ($P < 0.05$) differences between groups. 2. Sex-wise occurrence of neoplasms in canines. Different alphabets are showing significant ($P < 0.05$) differences between groups. 3. Sex-wise occurrence of CTVT in canine. Different alphabets are showing significant ($P < 0.05$) differences between groups. 4. Sex-wise occurrence of skin and other tumours in canine. Different alphabets are showing significant ($P < 0.05$) differences between groups.

There are several reports regarding the incidence of tumours in dogs (Vachhani *et al.* 2004, Maiti 2004, Mahapatra *et al.* 2005, Pawar 2006, Maiti *et al.* 2009). This is in agreement with the previous reports (Rutteman *et al.* 2000). Spitz (34.39%) was the commonest breed affected with tumours followed by Mongrel (28.54%). This may be attributed to the fact that breed prevalence varies widely depending on available population in different geographic zones and period (Das and Parhi 2003).

In CTVT significantly ($P<0.01$) more cases were recorded in females (67.63%) than in males (32.37%). All the cases of mammary tumour were recorded in females only. No case was reported in male dogs.

Being contagious tumour and transmitted by coital route CTVT affects the dogs having precarious breeding history. Most of the dog owners in the locality reported irregular breeding history and kenneling practice of their pets (Sivakumar 2000, Mahapatra *et al.* 2005). This was in

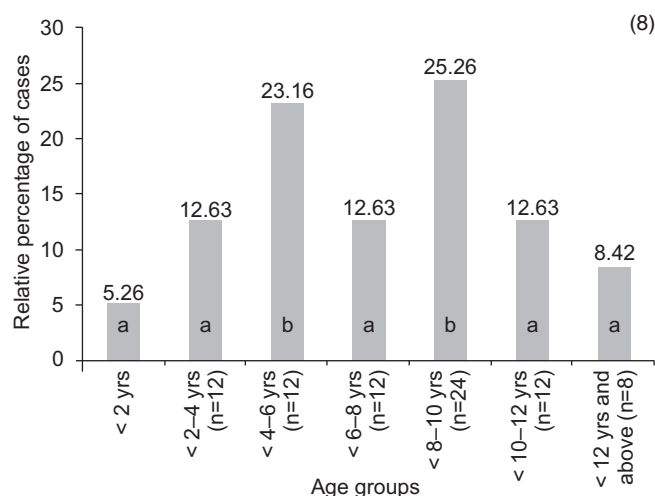
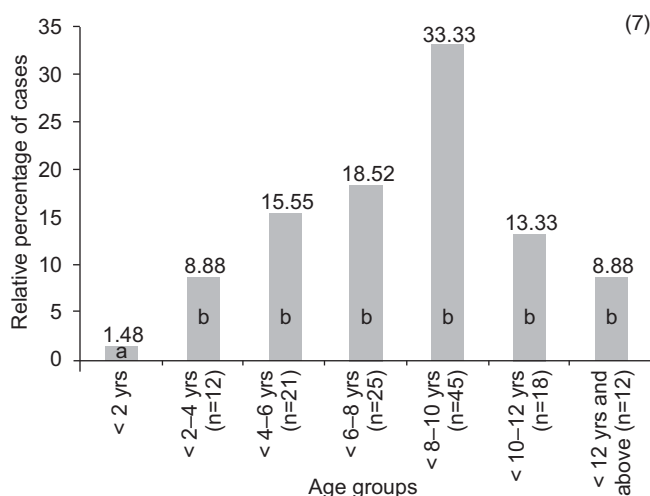
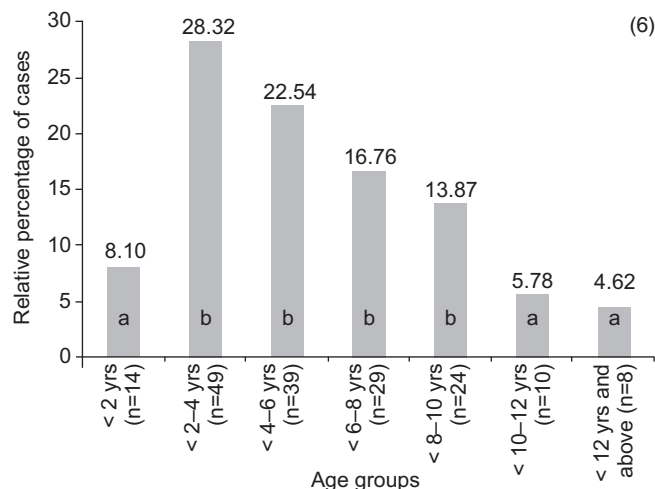
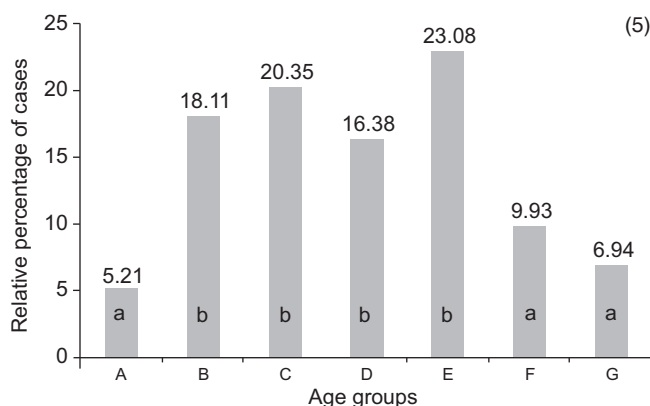
conformity with the reports of Rutteman *et al.* (2000) and Vachhani *et al.* (2004). However, Calvert *et al.* (1982) reported that there was no clear sex predisposition in CTVT.

In skin and other tumours significantly ($P<0.01$) more cases were recorded in males (65.26%) than in females (34.74%).

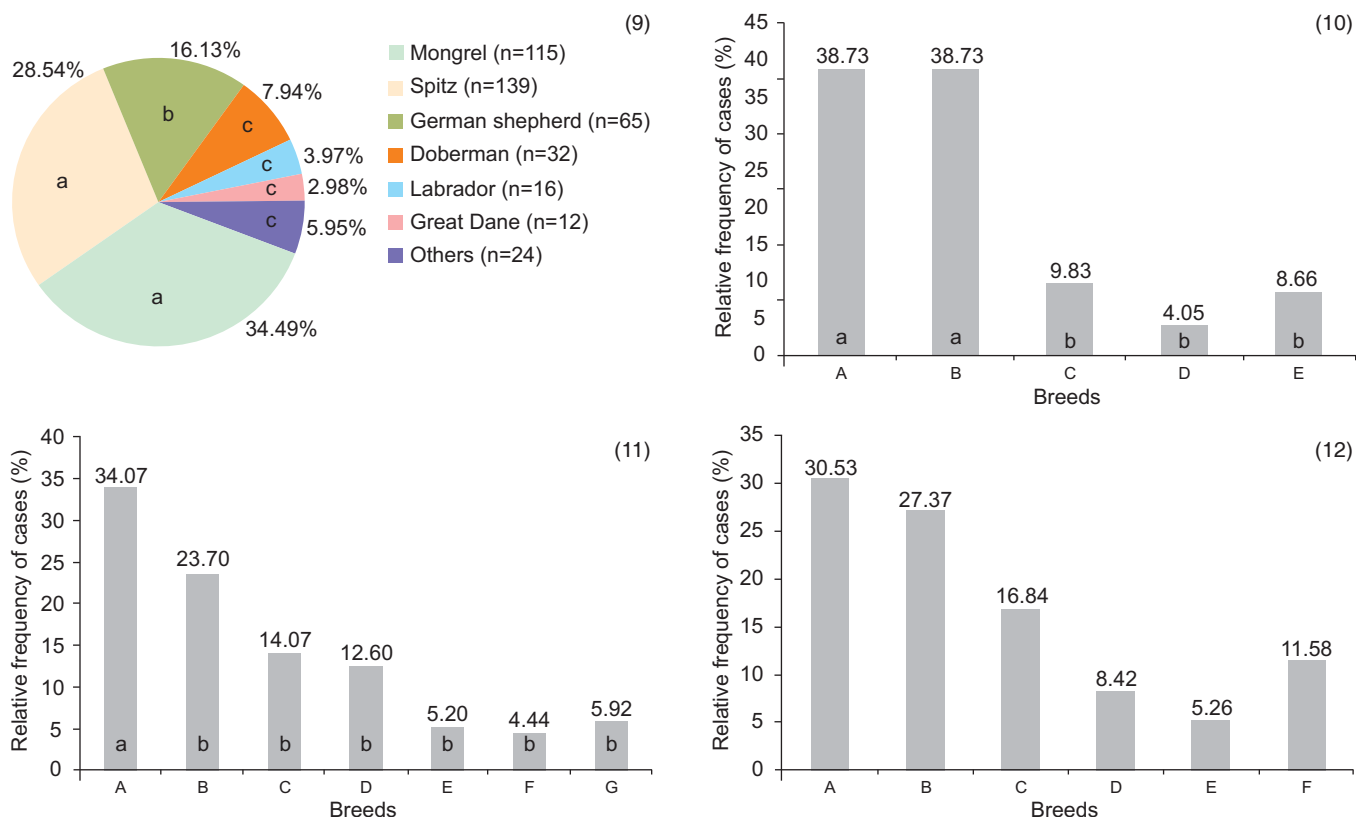
Age wise occurrence: In canine neoplasms, in general, significantly ($P<0.01$) more cases were recorded in the age group of 8–10 years (23.08%) followed by 4–6 years (20.35%), 2–4 years (18.11%), 6–8 years (16.38%), 10–12 years (9.93%), 12 years and above - (6.94%) and <2 years (5.21%).

CTVT cases recorded in different age group were significantly ($P<0.01$) more in 2–4 years (28.32%) followed by 4–6 years (22.54%), 6–8 years (16.76%), 8–10 years (13.87%), <2 years (8.10%), 10–12 years (5.78%), and 12 years and above (4.62%).

In mammary tumour significantly ($P<0.01$) more cases



Figs 5–8. 5. Age-wise occurrence of neoplasms in canines. Different alphabets is showing significant ($P<0.05$) differences between groups. 6. Age-wise occurrence of CTVT in canine. Different alphabets are showing significant ($P<0.05$) differences between groups. 7. Age-wise occurrence of mammary tumour in canine. Different alphabets are showing significant ($P<0.05$) differences between groups. 8. Age-wise occurrence of skin and other tumour in canine. Different alphabets are showing significant ($P<0.05$) differences between groups.



Figs 9–12. **9.** Breed-wise occurrence of neoplasms in canine. Different alphabets are showing significant ($P < 0.05$) differences between groups. **10.** Breed-wise occurrence of CTVT in canine. A: Spitz ($n=67$); B: Mongrel ($n=67$); C: German Shepherd ($n=17$); D: Doberman ($n=7$); E: Others ($n=15$). Different alphabets are showing significant ($P < 0.05$) differences between groups. **11.** Breed-wise occurrence of mammary tumour in canine. A: Spitz ($n=46$); B: German Shepherd ($n=32$); C: Mongrel ($n=19$); D: Doberman ($n=17$); E: Labrador ($n=7$); F: Great Dane ($n=6$); G: others ($n=8$). Different alphabets are showing significant ($P < 0.05$) differences between groups. **12.** Breed-wise occurrence of skin and other tumours in canine. A: Mongrel ($n=29$); B: Spitz ($n=26$); C: German Shepherd ($n=16$); D: Doberman ($n=8$); E: Labrador ($n=5$); F: others ($n=11$). Different alphabets are showing significant ($P < 0.05$) differences between groups.

were recorded in the age group of 8–10 years (33.33%), followed by 6–8 years (18.52%), 4–6 years (15.55%), 10–12 years (13.33%), 12 years and above, 2–4 years (8.88% in each group), <2 years (1.48%).

In mammary tumours, the risk for development increases as the age advances. Boldizser *et al.* (1992) and Egenvall *et al.* (2005) reported highest incidence of mammary tumour in 10–12 years old dogs. Adak (2005) reported that out of 115 canine mammary tumours, 65% occurred between 8 to 12 years of age. In agreement with these reports, the incidence of mammary tumour was highest in age group of 8–10 years followed by age above 10 years. As a rare observation 2 cases of mammary tumour were recorded in animals of less than 2 years of age.

In this study, posterior mammary glands (fourth and fifth) were mostly involved (65%) compared to their anterior counterparts (35%). The reason for this is that the posterior glands are having greater volume of breast tissue (Moulton *et al.* 1970).

In skin and other tumours significantly ($P < 0.01$) more cases were recorded in the age group of 8–10 years (25.26%),

followed by 4–6 years (23.16%), 2–4 years, 6–8 years and 10–12 years (12.63% in each group), 12 years and above (8.42%), and <2 years (5.26%).

Breed wise occurrence: In general significantly ($P < 0.01$) more cases were recorded in the Spitz (34.49%), followed by Mongrels (28.54%), German shepherd (16.13%), Doberman (7.94%), Labrador (3.97%), Great Dane (2.98%). No significant difference was noticed among the other breeds.

In CTVT significantly ($P < 0.01$) more cases were recorded in Spitz and Mongrel (38.73% in each breed) followed by German shepherd (9.83%), Doberman (4.05%). No significant difference was noticed among the other breeds (Fig 10).

This was in conformity with the reports of Calvert *et al.* (1982) and Sivakumar (2000). Mongrel comprises non-descript dogs, which were typical population of free roaming non-kenned dogs. Also Spitz were not totally kenned and allowed to roam free. So that, they easily have sexual contact with the dogs having CTVT. Although CTVT can affect at all age groups, but in the present study, relatively young age group was significantly more affected than older age groups.

This is in agreement with earlier published reports (Das *et al.* 1991, and Sivakumar 2000).

In mammary tumour significantly ($P < 0.01$) more cases were recorded in Spitz (34.07%) followed by German shepherd (23.70%), Mongrel (14.07%), Doberman (12.60%), Labrador (5.20%), Great Dane (4.44%) No significant difference was noticed among the other breeds of canine.

Moulton (1999) recorded 25–50% mammary tumours in female dogs and found that it is the second most common tumour in dogs. Dhaygude (2006) reported that mammary tumour account for 34.67% of total tumour cases in dogs. Similarly in this study also, mammary neoplasms represented 33.50% of all tumours in dogs. Mammary tumours occur exclusively in female dogs, like this study. However, there are several reports of mammary tumours in male dogs ranging from 1.38 to 1.71% (Priester 1979).

Karma *et al.* (2007) reported that the prevalence of mammary tumours was maximum in Spitz (55.55%) followed by German Shepherd (22.22%) and Mongrel (14.07%). Dhaygude (2006) reported that German Shepherd (37.2%) was the most susceptible to develop mammary tumours. Majumdar and Som (1995) recorded more number of German Shepherd bitches affected with mammary tumour. Similarly, in this study, Spitz (34.08%) and German Shepherd (23.70%) were most commonly affected. This may be attributed to the cause popularity of the breeds in this area.

In skin and other tumours significantly ($P < 0.01$) more cases were recorded in Mongrel (30.53%) and Spitz (27.37%) followed by German Shepherd (16.84%), Doberman (8.42%), Labrador (5.26%), Boxer (4.21%). No significant difference was noticed among the other breeds.

Season and geographic region wise- occurrence: No significant difference was recorded in the occurrence of spontaneous tumours in canines in different seasons. Cases were recorded uniformly in all the seasons. Significantly ($P < 0.01$) more cases were recorded from Bareilly District (77%). Some cases also recorded from adjacent districts around Bareilly like Moradabad and Rampur.

Location of mammary tumours: Significantly more cases (65%) of mammary tumour were recorded in the posterior mammary gland compared to their anterior counter parts (35%).

The etiology of spontaneous mammary neoplasia in dog is unknown. But several studies were conducted to unveil this enigma. The risk reducing effect of early ovariohysterectomy in development of mammary tumour in dog is well notified (Sorenmo *et al.* 2000). Development of mammary neoplasm is hormone dependent, with risk for development of mammary tumour in bitches spayed before first estrus, after one estrus and after 2 or more cycles being 0.5%, 8% and 26%, respectively (Loar 1989). A higher risk of mammary cancer was reported for multiparous bitches (Schneider 1970). Incriminating factors put forth for etiological significance of mammary tumour in dogs are

sex hormonal derangement, higher growth hormone level, use of progestin's for estrus control and b-type retroviral articles, BRCA-1/2 gene mutations (Page 2001, Stacey *et al.* 2004).

In this study, skin and other tumours (23.57%) were observed in dogs. More cases of skin tumours were recorded in the male dogs (65.26%) than females (34.74%). This is in agreement with the findings of the Mahapatra *et al.* (2005) Season-wise no predisposition of tumours was observed. Cases were recorded uniformly in all the seasons.

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