

Original Research Article

Incidence of Commonly Occurring Neoplasms amongst Canines in Patna

Subhash Kumar Das Arya^{1*}, Kaushal Kumar¹, Deepak Kumar¹, Sanjiv Kumar¹, Ramesh Tiwary², Manikant Sinha³, Arun Kumar⁴, Sikandar Yadav¹, Shushama Suman¹, Md. Armanullah⁵, Anish Kumar⁶, Hareram Kumar² and Ravi Ranjan Kumar²

¹Department of Veterinary Pathology, ²Department of Surgery and Radiology, ³Department of Animal Nutrition, ⁴Department of Livestock Production and Management ⁵Department of Veterinary Microbiology⁵ and Department of Veterinary Medicine⁶

Bihar Veterinary College, Patna

Bihar Animal Science University, Patna, India-800014

*Corresponding author

ABSTRACT

The present experiments were conducted to know the incidence of neoplasms in canines from May 2016 to April 2017. Out of 31 cases 29 cases were collected from Teaching Veterinary Clinical Complex (TVCC), Bihar Veterinary College (BVC), Patna, 1 case was brought for P.M. examination in Department of Veterinary Pathology and 1 case from local private clinics in and around Patna. The incidences of neoplastic conditions were higher in bitches than in male dogs. The highest risk of development of several neoplasms were reported in the age group of 9-12 years, followed by 6-9 years, 12-15 years, 3-6 years and 0-3 years respectively. The incidence of neoplasms were highest in Pomeranian (35.48%), German shepherd (25.80%), Labrador retriever (19.35%), Golden retriever (6.45%), Dalmatian (6.45%) and non-descript (3.23%) respectively. Month wise incidence of canine neoplasms were found to be maximum during June 6/31 (19.35%), followed by May 5/31 (16.13%), January 4/31 (12.90%), February 4/31 (12.90%), April 3/31 (9.68%), September 3/31 (9.68%), March 2/31 (6.45%), December 2/31 (6.45%), October 1/31 (3.23%), November 1/31 (3.23%) and no incidence of neoplasm was recorded in July and August respectively. Neoplasms of mammary gland, skin and genital organs were more common. However, the neoplasms of muscles, gastrointestinal tract and bone showed lower incidence in canines.

Keywords

Dogs, Neoplasm, Incidence

Introduction

Cancer is a major public health problem worldwide. It is a group of disease characterized by uncontrolled growth and spread of abnormal cells. Cancer is one of the leading causes of death in the world and its incidence is still increasing, particularly in developing countries. The global burden of cancer is projected to increase from 13.3 to 21.4 million incident cases between 2010

and 2030 due to demographic changes alone, dominated by a growing burden in low and middle income countries like India (McCormack and Boffetta, 2011).

As compared to human, in canines, neoplasms are more frequent (Dhami *et al.* 2010). The causative agent of tumours in dog is multifactorial (Roshni *et al.* 2013)

which include the participation of sex hormones, genetic, oncogenic viruses, immunological factors, environmental factor and environmental carcinogens as well. These tumours can be seen in most of the canine breeds in varying geographical areas covering different age groups (Kashyap *et al.* 2013).

The incidence of commonly occurring tumours in dog can pinpoint variations in cancer incidence in target organs. The present study may serve to determine whether potential correlations exist between an increase or decrease in cancer incidence and environmental hazards. Meagre information is available regarding occurrence and types of tumour in canine in different geographical location of Patna, Bihar. Therefore, the present study is aimed to know the incidence of commonly occurring neoplasms in canines.

Materials and Methods

The present experiment was observed on 31 canines of different age, sex and breeds round the year presented in TVCC, BVC, Patna for treatment, also from the canines brought for P. M. examinaion in the Department of Veterinary Pathology and private clinics in and around Patna from June 2016 to July 2017. The incidence of neoplasm was studied on the basis of age, sex, breed, month and organs as well as histo-types of canines neoplasms. Data generated were subjected to statistical analytical as per methods described by Snedecor and Cochran, 2004.

Results and Discussion

Sex wise incidence

The incidence of canine tumours (either benign or malignant) were found to be more

in female canines 20/31 (64.32%) than in male 11/31 (35.48%) dogs. Merlo *et al.* (2008) also reported that incidence of neoplasm were found to be three times more in bitches as compared to male dogs. The results of present study also corroborated with that Chandravathi *et al.* (2014) in Hyderabad region, Hamid *et al.* (2014) in dogs of Jammu region and Phangcho *et al.* (1990) in Assam region.

The female predisposition for certain neoplasms may be attributed to system association between female hormones and reproductive factors and mammary tumours risk particularly for adenocarcinoma more over biological rationales emerged to attempt to explain why females might be more susceptible to neoplasm or other carcinogens. It must be included that there is sex difference in the metabolism or detoxification of carcinogens, hormonal interaction as suggested by the detection of estrogens and progesterone receptors in neoplastic tissues, and differential proliferation or growth stimulation effects indicated by gastrin releasing peptide receptors expression markers more common among female than male canines.

Age wise incidence

The highest incidence of commonly occurring neoplasm in canine were observed at the age group between 9-12 years followed by 6-9 years, 12-15 years, 3-6 years, and 0-3 years respectively in the present study (Table:1). The present observations corroborated with that of Kumar *et al.* (2011) in Chennai, Majie *et al.* (2013) in Kolkata region, Roshni *et al.* (2013) in Mumbai region, Chandravathi *et al.* (2014) in Hyderabad region and Gupta *et al.* (2012) among various breeds of dogs. The probable reason for preponderant occurrence of neoplasia during old age could

be attributed to the fact that long latent period was necessary for tumour development and its progression; also, carcinogen exposures need to prolonged for efficient mutagenesis or aging tissue has more susceptibility to neoplastic transformation as compared to juvenile tissues.

Immunological surveillance system also becomes sluggish with aging, failing to protect as zealously as in young one against cellular insult which ultimately becomes cancerous.

Month wise incidence

Month wise incidence of canine neoplasms was found to be maximum during June 6/31 (19.35%), followed by May 5/31 (16.13%), January 4/31 (12.90%), February 4/31 (12.90%), April 3/31 (9.68%), September 3/31 (9.68%), March 2/31 (6.45%), December 2/31 (6.45%), October 1/31 (3.23%), November 1/31 (3.23%) and no incidence of tumours were reported in the months of July and August. Our findings were in accordance of the observations of Hamid *et al.* (2014) that the incidence of spontaneously occurring canine tumour was higher in April-May (27.27%) followed by June-July (25.45%), August-September and February-March (18.18%), and December-January (10.90%) in Jammu region. Month wise incidence of tumours were also studied by Srivastava *et al.* (2009) and Boldizar *et al.* (1992) revealed variation in the incidence of tumour in different months of a year which was in contrast with the results of the present study. This shows that, the incidence of neoplasm was no any established strong co-relation with their month wise incidence. Prolong latent period required for the development of neoplasm may be one reason behind in consistent month wise incidence of tumour.

Breed wise incidence

It was observed that the frequency of occurrence of tumours were highest in Pomeranian breed 11/31 (35.48%) followed by German shepherd 8/31 (25.80%), Labrador retriever 6/31 (19.35%), Golden retriever 2/31 (6.45%), Cross breeds 2/31 (6.45%), Dalmatian 1/31 (3.23%) and non-descript dogs 1/31 (3.23%) respectively. Almost similar and or different breed wise incidence were also reported by earlier workers Komazawa *et al.* (2016) in Gifu prefecture, Hamid *et al.* (2014) in Jammu region and Majie *et al.* (2013) in Kolkata region.

The variation among breed predisposition to tumour incidence in canines might be due to the fact that pet owners have specific choice for particular breed depending on popularity of breed in that region. To determine an accurate breed predisposition, it is necessary to obtain data on a larger scale among different breeds of dog available in the prevailing region. In the absence of reliable data of available breeds for tumours incidence, it is difficult to pin point any breed as most susceptible one for canine tumours. Some breed differences are related to single specific factors concerning that breed. Examples may be colour such as light skin area around the eye or size in the Great Dane and Saint Bernard dogs experience more osteosarcoma than average sized dog breeds as reported by Tjalma, (1966).

Organ wise incidence

The organ wise incidence of canine mammary tumours (CMTs) were highest 13/31 (41.93%) followed by tumours of skin 7/31 (22.58%) among commonly occurring neoplasm in Patna region (Table: 2). The aforesaid results were confirmatory with Merlo *et al.* (2008) and Veena and Kumar,

(2014) who had reported the highest incidence of CMTs followed by skin neoplasms in bitch. The incidence rates of CMTs were confirmatory with the findings of earlier workers Benjamin *et al.* (1999) and Vascellari *et al.* (2016) which evidenced the ovarian hormones, mainly imbalance between estrogens and progesterone, are known to play a key role in the marked incidence of CMTs among bitches.

It was observed that out of 31, only 3 cases of canine transmissible venereal granuloma (9.68%) in bitch were recorded. An

epidemiological study on canine tumours done by Zuckermann *et al.* (2013) and Simon *et al.* (2016) also revealed least incidence of transmissible venereal granuloma in dogs. The canine transmissible venereal granuloma was a neoplasm naturally transmitted in susceptible canines by transplantation of viable tumour cells. The biological behavior of transmissible venereal granuloma was quite variable and depends on the host immune response and metastasis usually occurs in suboptimal physiological conditions of the canines, such as immuno-suppression and malnutrition.

Table.1 Age wise incidence of different neoplasms in canines (N=31)

Age group (years)	No. of samples	Percentage (%)
0-3	03	9.68
3-6	05	16.13
6-9	06	19.35
9-12	12	38.71
12-15	05	16.13
Total =31		

Table.2 General classification of different neoplasms occurring in canines (N=31)

Sl. No.	Tissue/Organ affected	Types of neoplasm	No. of cases	Percentage (%)
1	Tumour of mammary gland	Solid Adenocarcinoma	4	12.90
		Mixed mammary gland tumours	4	12.90
		Tubular Adenocarcinoma	3	9.68
		Fibroadenoma	2	6.45
2	Tumour of genital organ	Transmissible venereal tumour	3	9.68
3	Tumour of muscles	Fibrosarcoma	1	3.23
		Leiomyoma	2	6.45
4	Tumour of skin	Myxoma	4	12.90
		Papilloma	3	9.68
5	Tumour of G.I.T	Epulis	3	9.68
6	Tumour of bone	Osteosarcoma	2	6.45
Total = 31				

In the present study, incidence of neoplasm of muscles *viz* leiomyoma 1/31 (3.22%) and fibrosarcoma 2/31 (6.45%) was found to be confirmatory with the findings of Gupta and Tiwari, (2009) which revealed comparatively low incidence of leiomyoma and fibrosarcoma in dogs. Amongst the skin neoplasm, highest incidence were of myxoma 4/7 (57.14%) and papilloma 3/7 (42.86%) respectively. The present study was in accordance with the retrospective survey undertaken by Chikweto *et al.* (2013) between years 2002 to 2007 on samples from canines residing in Grenada and found 5.6% cases of papillomas among 255 neoplastic cases of dog. This might be due to the fact that responsible agents for skin and muscles neoplasms were oncogenic virus.

The incidence of neoplasm of gastrointestinal tract (G.I.T.) diagnosed as epulis was 3/31 (9.68%) among commonly occurring tumours in canines. Similarly, Husseiny *et al.* (2015) reported the 7.14 % incidence of epulis while studying orodental affections of soft tissues in 28 dogs. The results were also in collaboration with Roshni *et al.* (2013) and John *et al.* (2011) who had reported low incidence of epulis among dogs. Epulis was thought to be developmental, inflammatory and hyperplastic in origin and often develop in association with chronic inflammation (periodontal disease) whereas acanthomatous ameloblastomas were invasive, recurrent and generally occur in animals with inflammation and milder dental plaque.

The incidence of neoplasm of bone. It was observed that out of 31 canines neoplasm only 2 cases (6.45%) of osteosarcoma in canines were recorded in present study. The results were confirmatory with Zuckermann *et al.* (2013). Appendicular osteosarcoma is

the main primary malignant and non-hematopoietic osteogenic tumour in canine. It appears spontaneously in the appendicular skeleton with a relevant incidence in canines. Canine osteosarcoma develops in high body weight gain and large breeds, constitutes the highest risk factor for appendicular osteosarcoma in canines.

Acknowledgement

The research facility provided by the Dean, Bihar Veterinary College, Patna, India, in the form of research grant provided by Vice-Chancellor, Bihar Agricultural University, Sabour, Bhagalpur, India are gratefully acknowledged.

References

- Boldizsar, H., Szenci, O., Muray, T. and Csenki, J. 1992. Studies on canine mammary tumours. I. Age, seasonal and breed distribution. *Acta Veterinaria Hungarica*. 40 (1-2):75-87.
- Chandravathi, T., Y, Anjaneyulu., Kumar, A. and V, Samatha, 2014. Incidence of canine neoplasms in and around Hyderabad, Andhra Pradesh. *International Journal of Food, Agriculture and Veterinary Science*, vol. 4(3):218-220.
- Chikweto, A., Kumthekar, S., Larkin, H., Deallie, C., Tiwary, K. P., Sharma, R. N., and Bhaiyat, M. I. 2013. Genital and Extragenital Canine Transmissible Venereal Tumor in Dogs in Grenada, West Indies. *Open Journal of Veterinary Medicine*. 3:111-114.
- Dhami, M.A., Tank, P. H., Karle. A. S., Vedaprakash, H. S. and Bhatia, A.S. 2010. Epidemiology of canine mammary tumours in Gujrat. *Veterinary World*. Vol. 3(6):282-285.
- Gupta, K., Sood, N. K., Uppal, S.K.,

- Mohindroo, J., Mahajan, S., Raghunath, M. and Singh, K. 2012. Epidemiological studies on canine mammary tumour and its relevance for breast cancer studies. *IOSR Journal of Pharmacy*. 2(2):322-333.
- Gupta, N. and Tiwari, S. K. 2009. Studies on incidence, histopatholog features and surgical management of neoplasms in canine veterinary canine. *Veterinary World*.2 (10):392-395.
- Hamid, A., Azmi, Shagufta., Rahman, S. and Sharma, 2014. Prevalence of spontaneously occurring neoplasms amngst canines in Jammu. *Indian J. of Canine Practice*. Vol.6, issue 1:87-90.
- Husseiny, I. N. E., Farghali, H. A. and Mohamed, A. N. 2015. Survey study on soft tissue affections of the oral cavity in dogs. *American Journal of Research Communication*. 4(1):97-112.
- John, M. K. D., Archana, A., Amma, S. T., Narayanan, M. K. and Pillai, U. N. 2011. Occurrence of dental affections in dogs – A study in 150 cases. *Indian Journal of Canine Practice*. 3 (2):138-139.
- Kashyap, D. K., Tiwari, S. K., Dewangan, G. and Giri, D. K. 2013. Prevalence of skin and subcutaneous tissue neoplasm in canines. *Indian Vet. J.* 90(8):90-92.
- Komazama, S., Sakai, H., Itoh, Y., Kawabe, M., Murakami, M., Mori, T. and Maruo, K. 2016. Canine tumor deve lopment and crude incidence of tumors by breed based on domestic dogs in gifu prefecture. *Journal of Veterinary Medical Science*. 78(8):1269-1275.
- Kumar, K. R. A., Rao, G. V. S. and Balachandran, C. 2011. Incidence, cytology, gross pathology and histopathology of mammary tumours in dogs of Chennai. *International Journal of Pharma and Bio science*. 2 (3):399-405.
- Majie, A. K. and Maji, A. K. 2013. Incidence of neoplasm of canine in Kolkata. *Indian Vet. J.*, 90(4):116-117.
- McCormack, V. A. and Boffetta, P. 2011. Today's lifestyles, tomorrow's cancers: trends in life style risk factors for cancer in low- and middle-income countries. *Annals of Oncology*. 22 : 2349–2357.
- Merlo, D. F., Rossi, La., Pellegrino, C., Ceppi, M., Cardellino, U., Capurro, C., Ratto, A., Sambucco, P.L., Sestito, V., Tanara, G. and Bocchini, V. 2008. Cancer incidence in pet dogs: findings of the Animal Tumor Registry of Genoa, Italy. *J. Vet. Intern. Med.*22(4):976-984.
- Phangcho, C. V., Dutta, B. M., and Mukit, A. 1990. Incidence of canine neoplasms in Assam. *Indian Veterinary Journal*. 67(9):881-882.
- Roshni, S., Kadam, D. P., Moregaonkar, S. D., Sawale, G. K., Tripathi, S. D., Pawar, A. A., Thakur, D. and Chawan, S. R. 2013. Occurrence of different neoplasm of dogs in Mumbai Region. *Indian J. Vet. Patho*, 37(2):138-140.
- Simon, M. S., Gupta, C., Sankar, P., Ramprabhu, R., Pazhanivel, N., Balachandran, C. and Prathanban, S. 2016. Incidence of transmissible venereal tumours in dogs. 2016. *Indian Vet. J.*, 93(09):72-73.
- Snedecor, G. W. and Cochran, W. G. 2004. In: *Statistical Methods* 10thEdn. Iowa State University Press, Ames, U.S.A.
- Srivastava, A. K., Sharma, A. K. and Singh, B. 2009. Canine mammary tumours: A study on occurrence and distribution pattern. *Indian Journal of Veterinary Pathology*. 33(1):109.
- Tjalma, R. A. 1966. Canine bone sarcoma: Estimation of relative risk as a function of body size. *Journal of National Cancer Institute*. 36:1137-11-1150.

- Vascellari, M., Capello, K., Carminato, A., Zanardello, C., Baioni, E. and Mutinelli, F. 2016. Incidence of mammary tumors in the canine population living in the Veneto region (Northeastern Italy): Risk factors and similarities to human breast cancer. *Preventive Veterinary Medicine*. 126:183-9.
- Veena, P. and Kumar, R.V.S. 2014. Chemo-surgical management of canine mammary tumour. *Indian Veterinary Journal*. 91(03):54-57.
- Zuckermann, I. C. S., Severin, K., Hohsteter, M., Artukovic, B., Beck, A., Kurilj, A. G., Sabocanec, R., Dzaja, P. and GrabareviC, Z. 2013. Incidence and types of canine tumours in Croatia. *Veterinarski Arhiv*. 83 (1):31-45.