

RETROSPECTIVE STUDIES ON TUMOR CONDITIONS IN DOGS OVER A PERIOD OF TEN YEARS (2005-2014)

DEEPIKA LATHER*, R.P. GUPTA and SONU SHARMA

Department of Veterinary Pathology, College of Veterinary Sciences
Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar-125 004, India

Received: 08.11.2016; Accepted: 28.01.2017

ABSTRACT

The present work was based on retrospective study of 88 biopsies of dogs received over a period of ten years (2005 to 2014). The result revealed that highest number of tumors was epithelial followed by mesenchymal and mixed ones. Sex-wise distribution of tumor cases revealed 47 cases (53.4%) in females and 41 (46.5%) in males. Maximum number of cases were 22 (25%) in the age group of 4-6 years followed by 19 (21.5%) in 8-10 years, 18 (20.4%) in 6-8 years, 17 (19.3%) in 2-4 years, 8 (9%) in 10-12 years and 4 (4.5%) in less than 2 years age group. Anatomical location-wise, the highest number of cases were in mammary gland region i.e. 27 (30.6%) followed by 21 (23.8%) in vaginal/uterine region, 17 (19.3%) in cutaneous/skin surface, 8 (9%) in eye region, 7 (7.9%) in oral/mouth region, 3 (3.4%) each in internal organs/anal region and one each in ear and prostate gland (1.1%). The maximum number of cases were of mammary gland adenoma/adenocarcinoma/carcinosarcomas in 22 (25%) followed by fibroma/fibrosarcoma in 17 (19.3%), transmissible venereal sarcoma in 10 (11.3%), squamous cell carcinoma in 9 (10.2%), myxoma in 6 (6.8%), haemangioma/haemangiopericytoma in 5 (5.6%) and melanoma in 3 (3.4%). Two cases (2.3%) each of papilloma, leiomyoma, basal cell carcinoma, hepatoma and one case (1.1%) each of mastocytoma, rhabdomyoma, ossifying fibroma, lipoma, prostate gland tumor, ameloblastoma, interalveolar carcinoma and seminoma were also observed. The year-wise data analysis of tumor conditions is useful to determine whether the incidence of tumours is on increasing trend.

Key words: Tumors, dogs, retrospective study

Cancer is the leading cause of mortality in dogs and cats. Spontaneous cases of tumours especially in canines offer an interesting opportunity for comparative studies and to understand cancer biology and drug development (Pawaiya and Kumar, 2008). Studies on animal cancer revealed variable incidence due to variation in geographical locations and existence of different breeds. Due to lack of systematic study and absence of Animal Cancer Registry in India, the scenario of cancer incidences in India is not well documented but reports on different tumour(s) conditions in canines have been published separately from all parts of India (Chaudhary and Rao, 1982; Phangcho *et al.*, 1990; Shekhar *et al.*, 2001; Aadk, 2005; Nair *et al.*, 2007; Reddy, 2007; Gupta and Tiwari, 2009). These retrospective epidemiological studies represent a helpful approach and an important source of information for analyzing neoplastic disease behaviour over a period of time.

MATERIALS AND METHODS

The study was conducted on the biopsy reports of last ten years i.e. from 2005 to 2014 available in the department for evaluating epidemiology of tumour conditions in dogs. Sex, age and anatomical location were recorded from the history of the case(s).

For the confirmatory histopathological diagnosis, representative pieces of formalin fixed biopsy tissues with thickness of 2-3 cm have been processed by paraffin embedded technique as per the standard procedure (Luna 1968). The tissue samples were washed in running tap water to remove formalin, processed in ascending grades of alcohol for dehydration and cleared in benzene, infiltrated and embedded in paraffin. The paraffin embedded tissues were cut into 3-4 μ thick section using automated microtome and stained with Hematoxylin and Eosin. Tissues sections wherever required have also been stained with special staining procedures such as Masson's trichrome stain to differentiate mesenchymal content (fibroma) with mixed epithelial tissue (myoepithelioma) and toulidine blue staining to rule out less differentiated mastocytoma (Luna, 1968).

RESULTS AND DISCUSSION

The result of 88 biopsies revealed that the highest number of neoplasm(s) affecting dogs were of epithelial origin, followed by mesenchymal and mixed tumours. More cases of epithelial neoplasm(s) were related to skin which is exposed to harmful UV radiations responsible for cancer development. Also the epithelial surface(s) are exposed to chemical and metabolic irritants which may act as direct or indirect carcinogens.

*Corresponding author: deepikalather@yahoo.co.in

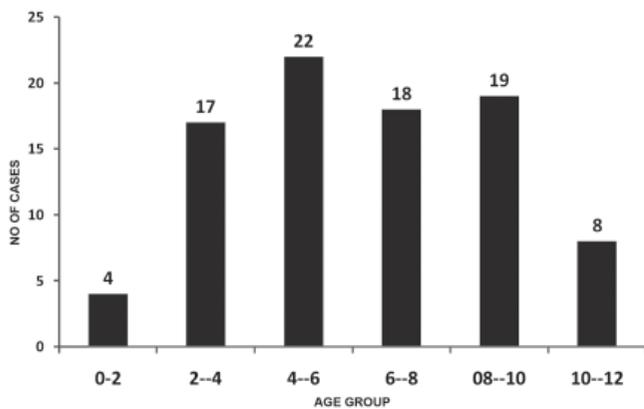


Fig. 1. Age group wise incidence of canine tumours during last ten years (2005-2014)

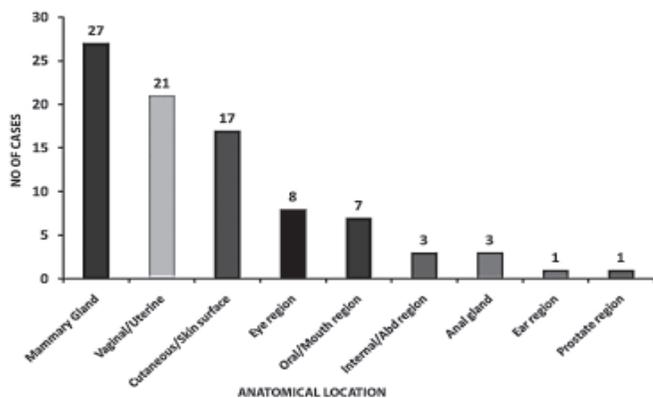


Fig. 2. Anatomical location-wise incidence of tumours affecting dogs during last ten years (2005-2014)

Sex-wise distribution of neoplasm(s) revealed 47 cases (53.4%) in females and 41 cases (46.5%) in males. Sex-wise tumor distribution revealed no effect of sex in tumour development. Similar findings were also described by other workers (Dorn *et al.*, 1968; Schafer *et al.*, 1998; Das and Parhi, 2003). However, Vachhani *et al.* (2004) revealed that the frequency of occurrence of neoplasms in Anand district was more in females (60%) than males (40%).

Age group-wise distribution of tumours is given in Fig. 1. Maximum number of cases was 22 (25%) in the age group of 4-6 years followed by 19 cases (21.5%) in 8-10 years, 18 cases (20.4%) in 6-8 years, 17 cases (19.3%) in 2-4 years, 8 cases (9%) in 10-12 years and 4 cases (4.5%) in less than 2 years' age group. Maximum number of cases was in the middle age group i.e. from 4-10 years, while few cases were found in less than 2 and more than 10 years of age. Consistent to our findings, Dorn *et al.* (1968) also reported peak incidence of canine neoplasms between 6-14 years of age. Similar observations were also reported by Das and Parhi (2003) where 7-9 years age group had the highest incidence of neoplasm(s)

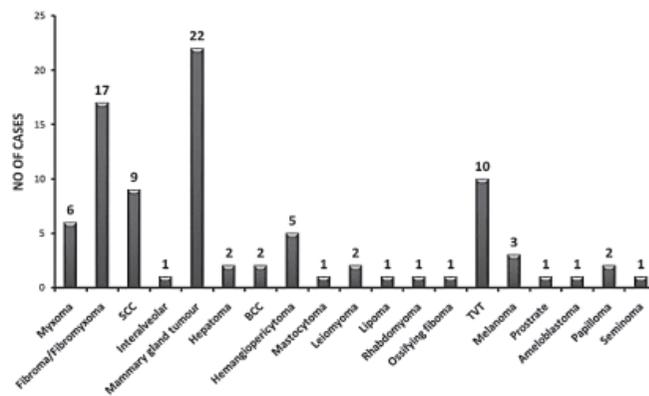


Fig. 3. Incidence of different tumour types affecting dogs during last ten years (2005-2014)

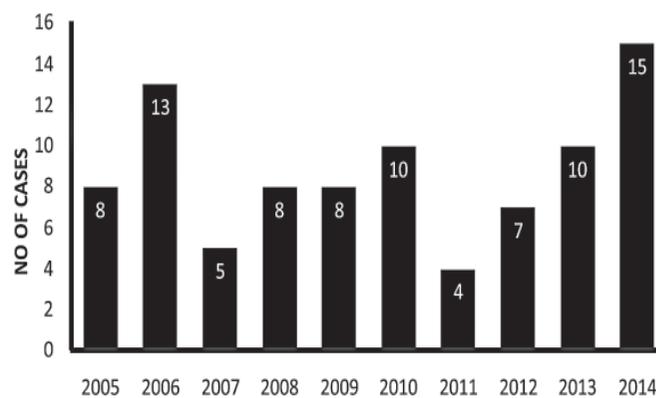


Fig. 4. Year-wise incidence of canine tumours from 2005 to 2014

particularly at 8 years of age and as the age increased, the incidence declined sharply. However, Schafer *et al.* (1998) reported tumor incidence using Kaplan-Meier survival curve analysis and log-rank analyses and observed that the susceptible family had highest tumor incidence(s) at 13.6 years of age. Few cases in very young dogs as observed in our study is supportive of the fact that the development of neoplastic conditions occur due to exposure of environmental carcinogens which causes mutations and accumulation of such genetic alteration(s) is proportional to increased age.

Anatomical distribution of tumours is illustrated in Fig. 2. The highest number of cases was in mammary gland region (30.6%) followed by vaginal/uterine region (23.8%), cutaneous/ skin surface (19.3%), eye region (9%), oral/mouth region (7.9%), internal organs/anal region (3.4%) and one case each in ear and prostate gland. Similar findings were reported by Vachhani *et al.* (2004) in which mammary gland, reproductive organ and skin were the most common sites for the neoplasm. However, Mukhopadhyay *et al.* (1992) and Moulton (1999) reported that mammary tumours were the second

most common group of neoplasms in dogs, following the skin tumors.

Different types of tumors recorded from the year 2005 to 2014 are illustrated in Fig 3. Maximum number was of mammary gland tumors (22; 25%) followed by fibroma/fibrosarcoma (17; 19.3%), transmissible venereal sarcoma (10; 11.3%), squamous cell carcinoma (9; 10.2%), myxoma (6; 6.8%), haemangioma/haemangiopericytoma (5; 5.6%) and melanoma (3; 3.4%). Two cases (2.3%) each of papilloma, leiomyoma, basal cell carcinoma, hepatoma and one case (1.1%) each of mastocytoma, rhabdomyoma, ossifying fibroma, lipoma, prostate gland tumour, ameloblastoma, interalveolar carcinoma and seminoma were also observed. Various types of mammary gland tumours reported were adenoma, adenocarcinoma, mixed mammary gland tumours and myoepithelioma. Similar to our findings Jani *et al.* (1992) and Pawar (2006) also reported mammary adenocarcinoma as the most frequently observed neoplasm followed by fibroma, transmissible venereal granuloma, basal cell carcinoma and squamous cell carcinoma. Das and Parhi (2003) studied incidence of canine neoplasms in Orissa and reported adenocarcinoma, adenoma and histiocytoma to be the most common types of tumors.

Year-wise incidence of tumors is illustrated in Fig. 4. It is clearly evident from this figure that the incidence of tumours in dogs was almost similar from 2005 to 2013 except in the year 2011 where it declined to four. The year-wise data analysis of tumor conditions is useful to determine whether the incidence of tumours is on increasing trend. The variation in number of cases appears variable due to less or variable reporting by the owners. In Veterinary medicine, the increase in the incidence of neoplastic disease (including mammary tumors) requires continuous development from veterinary oncology specialists. These studies are also useful for establishing risk factors and prognosticating criteria from clinical and histopathological features. Therefore, these may be translated into relevant scientific information that may be used as a basis for experimental studies. Therefore, such studies are of clinical significance to plan further research programme.

REFERENCES

- Adak, A. (2005). Immunopathological study of canine mammary tumours. M.V.Sc. thesis, Bombay Veterinary College, MAFSU, Nagpur.
- Chaudhary, C. and Rao, M.R.K. (1982). Certain canine neoplasms encountered in Andhra Pradesh. *Indian Vet. J.* **59(2)**: 100-102.
- Das, B.C. and Parhi, N.K. (2003). Incidence of canine tumors in Orissa (2000-2002). In Compendium of XX Annual Conference of IAVP, Department of Veterinary Pathology, College of Veterinary Sciences, Jabalpur.
- Dorn, C.R., Taylor, D.N., Frye, F.L. and Hibbard, H.H. (1968). Survey of animal neoplasms in Alameda and Contra Costa Counties, California I. Methodology and Description of cases. *J. Nat. Cancer Inst.* **40**: 295-305.
- Gupta, N. and Tiwari, S.K. (2009). Study on incidence, histopathological features and surgical management of neoplasms in canine. *Vet. World* **2(10)**: 392-395.
- Jani, P.B., Joshi, B.P. and Prajapati, K.S. (1992). Occurrence of neoplastic conditions in canine. In: IX Annual Conference of the Indian Association of Veterinary Pathologists', Department of Veterinary Pathology, Madras Veterinary College, Chennai.
- Luna, L.G. (1968). Manual of Histological Staining Methods of the Armed Forces Institute of Pathology. (3rd edn.), McGraw Hill Book Company, New York.
- Moulton, J.E. (1990). Tumors in Domestic Animals. (3rd edn.), University of California Press, Berkeley, CA.
- Mukhopadhyay, S., Bhattacharyya, S. and Som, T.L. (1992). Pathology of skin neoplastic conditions in dogs. In: IX Annual Conference of the Indian Association of Veterinary Pathologists', Department of Veterinary Pathology, Madras Veterinary College, Chennai.
- Nair, B., Kumar, C. Sai, G., Sharma, R. and Paliwal, O.P. (2007). A study on spontaneous canine neoplasms in Bareilly, UP. *Indian J. Vet. Pathol.* **31(2)**: 166-168.
- Pawaiya, R.V.S. and Kumar, R. (2008). Relevance of veterinary oncology in human cancer research. *Indian J. Vet. Pathol.* **32(2)**: 200-205.
- Pawar, S.K. (2006). Epidemiological studies of canine neoplasms with special reference to mutational analysis of p53 gene in canine mammary tumors by PCR-SSCP. M.V.Sc. thesis, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand.
- Phangcho, C.V., Dutta, B.M. and Mukit, A. (1990). Incidence of canine neoplasms in Assam. *Indian Vet. J.* **67(9)**: 881-882.
- Reddy, G.B. Manjunatha, Kumar Ram, Kumar, P., Sharma A.K. and Singh, N.D. (2007). Canine skin tumours: Occurrence and histopathology. *Indian J. Vet. Pathol.* **33(2)**: 108-112.
- Schafer, K.A., Kelly, G., Schrader, R., Griffith, W.C., Muggenburg, B.A., Tierney, L.A., Lechner, J.E., Janovitz, E.B. and Hahn, E.E. (1998). A canine model of familial mammary gland neoplasia. *Vet. Pathol.* **35**: 168-177.
- Shekhar, C.S., Vijaysarathi, S.K., Gowda, R.N.S and Suguna, Rao, S. (2001). An epidemiology study on canine mammary tumours. *Indian Vet. J.* **78(2)**: 107-109.
- Vachhani, K.V., Ghodasara D.J., Parmar, H.C., Jani, P.B. and Prajapati, K.S. (2004). Incidence of neoplastic conditions in canines. In: XXI Annual Conference of IAVP, Department of Veterinary Pathology, Kolkata (West Bengal).