Original Research

The Incidence of Canine Spontaneous Tumours Diagnosed on The Basis of Cytology and Histology in Malwa Region

Aditya Sharma, Supriya Shukla*, Nidhi Shrivastava, B. P. Shukla and Ankur Narad

Department of Veterinary Pathology, College of veterinary Sciences and animal Husbandry, Mhow, Madhya Pradesh, INDIA

***Corresponding author:** drsupriyav@gmail.com

Rec. Date:	Sep 06, 2019 07:29
Accept Date:	Oct 19, 2019 17:45
DOI	10.5455/ijlr.20190906072920

Abstract

Neoplasia is an important concern for veterinary practitioners, diagnosticians and researchers because of its increasing prevalence and is one of the major cause of animal death. Tumour diagnosis for individual animals is becoming an increasing prominent part of small animal practice. The present study was undertaken to assess the incidence of various types of tumours in malwa region using cytology and histopathology. Fifty-eight tumour samples were collected from dogs irrespective of their sex, breed, age and were grouped in three categories viz. mammary, skin and visceral tumours cytology performed in 30 freshly incised tissues revealed 14(46.66%) samples as benign and 16(53.33%) to be malignant. Overall incidence of tumours based upon their location was maximum in case of Skin (50%) followed by Visceral (25.86%) and Mammary (24.13%). Histopathologically, incidence was maximum for Fibrosarcoma (10.34%) followed by others. Malignant tumours accounted for 62.06% of all cases among 58 tumour samples.

Key words: Benign, Canine, Histopathology, Malignant

How to cite: Sharma, A., Shukla, S., Shrivastava, N., Shukla, B. P., & Narad, A. (2019). The Incidence of Canine Spontaneous Tumours Diagnosed on the Basis of Cytology and Histology in Malwa Region. *International Journal of Livestock Research*, *9*(11), 132-138. doi: 10.5455/ijlr.20190906072920

Introduction

Neoplasm is a new growth composed of cells, originally derived from normal tissues that have undergone heritable changes allowing them to become relatively unresponsive to normal growth controls and to expand beyond their normal anatomic boundaries. Neoplasm can be benign or malignant. Benign neoplasms do not grow aggressively, do not invade the surrounding body tissues and do not spread throughout the body. Malignant neoplasms on the other hand, tend to grow rapidly, invade the tissues around them, and spread or metastasize to other parts of the body. The keystone of the diagnosis is a histologic or cytological confirmation of malignancy involving the analysis of tumour tissue and cells for the histopathological and

cytological examination. Histopathology is considered as the gold standard for diagnosis of tumours as it can provide an indication of the 'grade' of a tumour. Cytology is also a very good technique for immediate diagnosis due to its high sensitivity and low cost.

Kashyap *et al.* (2013) carried out investigation to study the incidence of spontaneously occurring tumours of skin and subcutaneous tissues in canines. Out of a total of 32 grossly suspected cases of spontaneously occurring cutaneous and subcutaneous tumours collected during the period of 12 months, 25 cases were confirmed as tumours on histopathological examination, 10 cases (40%) being malignant in nature which included basal cell carcinoma, squamous cell carcinoma, rhabdosarcoma, tubulo-papillary adenocarcinoma, venereal granuloma, and fibrosarcoma. The other 15 (60%) cases were benign in nature and included fibroma, histiocytoma, fibroadenoma and leiomyoma. Zuckermann *et al*. (2013) studied the incidence and types of tumours in croatia.Most of the tumours encountered were malignant (59.1%), 35.4% were benign and 5.29% were not specified. Tumours orignating from the skin and subcutis were (45.73%),mammary gland (21.75%) and genital system were (7.97%).The most common specific tumour types diagnosed were mammary tubulopapillary carcinoma(7.14%),mast cell tumour(4.91%) and fibrosarcoma(4.91%).

Baioni *et al.* (2017) reported canine cancer incidence from canine population based tumour registry in northwestern Italy. The overall incidence rate for malignant tumours was 804 per 100,000 dogs and for benign it was 897 per 100,000 dogs. Higher rates for all cancers were observed in purebred dogs particularly in Yorkshire terrier and Boxer. The most malignant neoplasms were cutaneous mastocytoma, hemangiopericytoma, mammary gland complex carcinoma and simple carcinoma.

Materials and Methods

The present study was carried out at Department of Veterinary Pathology, Veterinary College Mhow and at Department of Veterinary Pathology, SDAU, SK Nagar Gujarat.

Collection of Samples for Cytology

A total of thirty freshly incised tissues were used for cytology depending upon the condition of the surgically excised tissue. Highly vascular and necrotic tumour masses were excluded. The specimens for cytological study were obtained from tumours by preparation of impression smears from the excised tumour mass. At least three slides were prepared from each tumour mass and then the slides were air dried for 1-2 minutes before fixing them in methanol. Finally the slides were stained with Giemsa stain for about 20 minutes and examined

Collection of Samples for Histopathology

58 gross tumour samples were collected during the study period. Representative tissue pieces (approximately 0.5 cm each) were collected from multiple (at least 3) sites from excised tumour masses

 DOI 10.5455/ijlr.20190906072920

and immediately fixed in 10% neutral buffered formalin (NBF) for 48-72 hours with 2-3 changes of formalin. After fixation in 10% NBF, tissue samples were trimmed to 1.5mm thickness and given overnight washing under running tap water. The tissue samples were then dehydrated by passing through ascending grades of ethyl alcohol, cleared in xylene and embedded with paraffin wax for block making. The sections were cut at 4-5µm thickness and stained by Haematoxylin & Eosin (H&E) stain as per standard procedure.

Results and Discussion

Overall Incidence of Various Tumours Based on Location

Among all the fifty-eight tumour samples in the present study, skin tumours had the maximum incidence (50%) among all the tumours followed by visceral tumours (25.86%) and mammary tumours (24.13%) (Table 1).

Table 1: Incidence of tumours based upon their location

Tumour type (Location Based,n=58)	Incidence (%)
Skin tumours (n=29)	50%
Visceral tumours (n=15)	25.86%
Mammary tumours (n=14)	24.13%

Cytology

Among all the different 30 cases of tumours, 14(46.66%) were found benign and 16(53.33%) were found to be malignant.Among 14 benign cases; 1 was canine mammary tumour (CMT), 11 were skin tumours (ST) and 2 were those of visceral tumours (VT).malignant cases included 7 mammary tumours,6 skin tumours and 3 visceral tumours (Table 2). The cytological evaluation of different tumours revealed characters like anisocytosis, anisokaryosis, hypercellularity, multinucleation and mitotic figures in malignant tumours (16) whereas benign tumours (14) were characterized by uniformity of cells, increase in n:c ratio and occasional anisonucleosis. These results are in concordance with the findings of Chandrashekaraiah *et al.* (2011), Acharya, 2015, Mohapatra *et al.* (2016), Yumusak *et al.* (2016) and Acharya *et al.* (2017) though their number of benign and malignant tumours varied depending upon the sample size.

DOI 10.5455/ijlr.20190906072920

Table 2: Cytological evaluation of tumours

Case number	Hypercellularity, Anisocytosis Anisokaryosis	Multinucleation	Mitotic Figures	Increased N:C ratio	Anisonucleosis	Uniform cells	Cytological Diagnosis
CMT1	+	_	+	+	+	_	Malignant
CMT2	+	+	+	+	_	_	Malignant
CMT3	+	+	_	+	+	_	Malignant
CMT5	+	+	+	_	_	_	Malignant
CMT6	+	+	+	+	_	_	Malignant
CMT10	_	+	_	+	_	+	Benign
CMT11	+	+	+	+	+	_	Malignant
CMT13	+	+	+	+	+	_	Malignant
ST5	_	_	_	+	_	+	Benign
ST6	+	_	+	+	+	_	Malignant
ST7	_	_	_	+	_	+	Benign
ST8	+	+	_	+	+	_	Malignant
ST9	+	+	_	+	+	_	Malignant
ST10	+	+	_	+	+	_	Malignant
ST11	_	_	_	_	_	+	Benign
ST12	+	_	_	+	+	_	Malignant
ST17	_	_	_	_	_	+	Benign
ST18	+	+	+	+	_	_	Malignant
ST22	_	_	_	_	+	+	Benign
ST23	_	_	_	_	_	+	Benign
ST24	_	_	_	_	_	+	Benign
ST26	_	_	_	_	_	+	Benign
ST27	_	_	_	+	_	+	Benign
ST28	_	_	_	_	+	+	Benign
ST29	_	_	_	_	_	+	Benign
VT3	+	+	+	+	_	_	Malignant
VT4	+	_	+	+	+	_	Malignant
VT7	_	_	_	_	_	+	Benign
VT10	+	+	+	+	+	_	Malignant
VT11	_	_	_	_	_	+	Benign

Histopathology

Incidence of various kinds of tumours was also recorded based on the histopathological type of tumours. Fibrosarcoma had the maximum incidence (10.34%) among all the types of tumours followed perianal gland adenoma (8.62%) and others. Full details of the incidences based on histogenic pattern are given in Table 3.

DOI 10.5455/ijlr.20190906072920

Table 3: Incidence of tumours based upon their histogenic type (n=58)

S. No.	Tumour Type (Histopathological Classification)	Incidence (%)
1.	Fibrosarcoma(n=6)	10.34%
2.	Perianal gland adenoma(n=5)	8.62%
3.	Oral papilloma(n=4)	6.89%
4.	Haemangiosarcoma(n=4)	6.89%
5.	Trichoblastoma(n=4)	6.89%
6.	Mixed carcinoma(n=4)	6.89%
7.	Tubulocarcinoma(n=4)	6.89%
8.	Mast cell tumour(n=3)	5.17%
9.	Tubulopapillary carcinoma(n=3)	5.17%
10.	Apocrine adenocarcinoma(n=3)	5.17%
11.	Haemangioma(n=2)	3.44%
12.	Haemangiopericytoma(n=2)	3.44%
13.	Poorly differentiated carcinoma(n=2)	3.44%
14.	Perianal gland carcinoma(n=1)	1.72%
15.	Chondrosarcoma(n=1)	1.72%
16.	Round cell sarcoma(TVT)(n=1)	1.72%
17.	Trichofolliculoma(n=1)	1.72%
18.	Tricholemmoma(n=1)	1.72%
19.	Angioleiomyoma(n=1)	1.72%
20.	Melanoma(n=1)	1.72%
21.	Ceruminous gland adenoma(n=1)	1.72%
22.	Ameloblastic fibro-odontoma(n=1)	1.72%
23.	Sertoli cell tumour(n=1)	1.72%
24.	Comedocarcinoma(n=1)	1.72%
25.	Carcinoma-*in situ*(n=1)	1.72%

Overall Incidence of Tumours Based on Their Histopathological Nature

Incidence of the tumours based upon their benign or malignant nature was also recorded (Table 4). Total incidence of benign tumours was found out to be 37.93 %(22/58) and for malignant tumours it was 62.06 %(36/58).

Table 4: Incidence of tumours based upon their histopathological nature

Tumour type (Nature)	Incidence (%)
Benign (n=22)	37.93%
Malignant (n=36)	62.06%

Irrespective of the age, breed and sex of the dogs, out of the 58 canine tumour samples collected, incidence of skin, visceral and mammary tumours was 50%,25.86% and 24.13% respectively. Malignant tumours were more (62.06%) as compared to benign tumours (37.91%). The type of malignant mammary tumours found were mixed carcinoma and tubulocarcinoma (6.89%), tubulopapillary carcinoma (5.17%) and single cases of comedocarcinoma, poorly differentiated carcinoma and a benign carcinoma *In situ*. These findings corroborate with the findings of Reddy *et al. (*2009), Dhami *et al.* (2010) and Zuckermann *et al. (*2013)

DOI 10.5455/ijlr.20190906072920

though the number of cases screened by these authors were more. Similar findings for all categories viz. skin, mammary and visceral tumours and different predisposition (benign or malignant) were reported by Asha (2015) and Salas *et al.* (2015).

The incidence of malignant skin tumours found in the study was fibrosarcoma (10.34%), mast cell tumour and apocrine adenocarcinoma (5.17%) and single cases of cutaneous haemangiopericytoma, chondrosarcoma, perianal gland carcinoma, melanoma and a poorly differentiated carcinoma, whereas the benign skin tumours included perinanal gland adenoma(8.62%), trichoblastoma (6.89%) and single cases of cutaneous haemangioma, trichofolliculoma and tricholemmoma. These observations are in agreement with Vascellari *et al.* (2003), Grabarevi *et al.* (2009), Pooja (2010), Simeonov *et al.* (2011), Kashyap*et al.* (2013) and Asha (2015). All these workers reported malignancy and matching incidences of mammary, cutaneous and visceral tumours. However, Baioni *et al.* (2017) reported a greater incidence of benign tumours and correlated it with the pure breed dogs.

The malignant visceral tumours found in the present study were haemangiosarcoma (6.89%) and single cases of round cell sarcoma (TVT) and vaginal haemangiopericytoma. A larger number of benign visceral tumours were obtained as compared to malignant viz.oral papilloma (6.89%) and solitary cases of sertoli cell tumours, angioleiomyoma, ceruminous gland adenoma, ameloblastic fibro-odontoma and haemangioma. These findings matched with Pooja (2010), Kashyap *et al.* (2013) and Asha (2015). However, the percentage of TVT (25.77%) was reported to be the highest by Kumar et al.(2017) and Dobson (2012). Grabarevi *et al.* (2009) reported the highest incidence of mastocytoma in male dogs and Simeonov *et al.* (2011) reported lipoma (5.58%) followed by fibrosarcoma (4.41%) as most common canine tumours, in contrast to the present investigations.

Conclusion

The present research on spontaneous canine tumours was done using standard diagnostic techniques of cytology and histopathology in clinical cases, irrespective of sex, age, breed and carcinogen etiology over a period of one year. Incidence of fibrosarcoma, oral papilloma, haemangiosarcoma, mixed carcinoma, carcinoma-*in situ* was found to be highest amongst the different types of cutaneous, visceral and mammary tumours respectively.

Acknowledgments

The authors are thankful to the Dean, Veterinary College Mhow and Dean, SDAU, SK Nagar Gujarat for providing the facilities to carry out the work.

DOI 10.5455/ijlr.20190906072920

References

1. Acharya, A.T. (2015). Comparative study on cytology and histopathology for diagnosis of canine neoplasms. Thesis,MVSc (Veterinary Pathology) submitted to Anand Agricultural University Gujarat.
2. Acharya, A.T., Ghodasara, D.J., Joshi, B.P., Dave, C.J., Prajapati, K.S., Purnima, B.J. and Khorajiya. (2017). Comparative diagnosis of canine mammary tumours by cytology and histopathology. *Indian Journal of Veterinary Pathology*, 41(3), 210-213.
3. Asha, A.P. (2015). Pathology of spontaneous canine tumours and evaluation of molecular biomarkers.Thesis, MVSc (Vety. Pathology) submitted to Deemed University, Indian Veterinary Research Institute, Izatnagar.
4. Baioni, E., Scanziani, E., Vincenti, M., Leschiera, M., Bozzetta, E., Pezzolato, M., Desiato, R., Bertolini, S., Maurella, C. M. and Ru, G. (2017). Estimating canine cancer incidence: findings from a population-based tumor registry in northwestern Italy. BioMed Central Journal, 13, 203.
5. Chandrashekaraiah, G. B., Rao, S., Munivenkatappa, B. S. and Mathur, K.Y. (2011). Canine squamous cell carcinoma: a review of 17 cases. *Brazilian Journal of Veterinary Pathology*, 4(2), 79-86.
6. Dhami, M.A., Tank, P.H., Karle, A.S., Vedpathak, H.S. and Bhatia, A.S. (2010). Epidemiology of Canine Mammary Gland Tumours in Gujrat. *Veterinary world*, 3(6), 282-285.
7. Dobson, J. M. (2013). Breed-predispositions to cancer in pedigree dogs. ISRN Veterinary Science.
8. Grabarevi, Z., Spoljar, J. B., Kurilj, A. G., Zuckermann, I. C.S., Artukovic, B., Hohsteter, M., Beck, A., Dzaja, P. and Strmecki, N. M. (2009). Mast Cell Tumor in Dogs– Incidence and Histopatholo Characterization. Collegium Antropologicum, 33(1), 253–258.
9. Kashyap, D. K., Tiwari, S. K., Dewangan, G. and Giri, D. K. (2013). Prevalence of skin and subcutaneous tissue neoplasm in canines. *Indian Veterinary Journal*, 90(8), 90-92.
10. Kumar, S., Peng, X, Daley, J., Yang, L., Shen, J., Nguyen, N.,Bae, G., Niu, H., Peng, Y., Hsieh, H.J., Wang, L., Rao, C, Stephan, C.C., Sung, P., Ira, G. and Peng, G. (2017). Inhibition of DNA2 nuclease as a therapeutic strategy targeting replication stress in cancer cells. Oncogenesis, 6(4), 319.
11. Mohapatra, A. K., Das, D., Panda, S. K., Jena, B. and Singh, J. (2016). Spontaneous Canine Mammary Neoplasia: A Clinicopathological Study. *Journal of Cell and Tissue Research*, 16(2), 5661-5666.
12. Pooja Arya. (2010).Clinical studies on surgical and chemotherapeutic management of canine connective tissue neoplasm.Thesis, MVSc (Vety. Surgery and Radiology) submitted to Rajmata Vijayaraja Scindia Krishi Vishwa Vidyalalya Gwalior.
13. Reddy, G.B.M., Kumar R., Pawan Kumar, Sharma, A.K. and Singh, N.D. (2009). Canine skin tumours: Occurrence and histopathology. Indian Journal of Veterinary Pathology, 33(2), 200-203.
14. Salas,S., Resseguier,N.,Blay, J.Y, Cesne, A.L., Italiano, A., Chevreau,C., Rosset, P., Isambert, N., Soulie, P.,Cuppisol, D. and Bay. J.O. (2015). Prediction of local and metastatic recurrence in solitary fibrous tumor. *Annals of Oncology*, 28(8), 1979-1987.
15. Simeonov, R. and Stoikov, D. (2011). Study on the correlation between the cytological and histological tests in the diagnostics of canine spontaneous mammary neoplasms. *Bulgarian Journal of Veterinary Medicine*, 9(3), 211-219.
16. Vascellari, M., Baioni, E., Ru, G., Carminato, A. and Mutinelli, F. (2003). Animal tumour registry of two provinces in northern Italy: incidence of spontaneous tumours in dogs and cats. *BMC Veterinary Research*, 5, 39.
17. Yumuşak, N., Çalişkan, M., Kutsal, Q., Kutsal, Q. (2016). Fine needle aspiration cytology (FNAC) in the diagnosis of canine hepatoid gland tumors- A comparative study with histopathology. Ankara Üniversitesi Veteriner Fakultesi Dergisi, 63, 259-266.
18. Zuckermann, I.C.S., Severin, K., Hohsteter, M., Artukovic, B., beck,A., Kurilij, A.G., Sabocanec, R., Dzaja, P. and Grabarevi,Z. (2013). Incidence and types of canine tumours in Croatia. *Veterinarski Arhiv*, 83(1), 31-45.

DOI 10.5455/ijlr.20190906072920