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Incidence and metastasis of canine malignant tumours by computed tomography (2022 to 2024)

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Abstract
The study was carried out in the Small Animal Surgery Unit of Madras Veterinary College, Chennai during the period of January 2022 to December 2024. Based on Fine Needle Aspiration Cytology (FNAC) malignant tumours were included for this study. Sex wise distribution were 63 male dogs (52.95%) and 56 female dogs (47.05%). Age of the affected dogs were from 1 year to 14 years with mean age of 8 years and standard deviation of 3.4 years. 57 dogs (47%) were affected in head and neck region, abdomen 45 dogs (37.8%), thoracic cavity 9 dogs (7.5%) and limbs 8 dogs (6.7%). 0-3 years 16(13.4%), 4-6 years 19(15.9%), 7-9 years 33(27.7%), 10-12 years 41(34.4), 13-15 years 10(8.4%) age wise distribution of tumours in dogs. Breed wise distribution were Mongrel dog 35 (29.4%), Labradors 18 (15.1%), Golden Retrievers 13(10.9%), German Shepherd dog 9 (7.6%), Rottweiler's 8 (6.7%), Spitz 8(6.7%), Doberman 7 (5.9%), Beagle 3(2.5%), Boxer 3(2.5%), Great Dane 3(2.5%), Chippiparai 2 (1.7%), Dachshund 2(1.7%), Pug 2 (1.7%), Siberian Husky 2 (1.7%), Terrier 2(1.7%), Shih Tzu 1(0.8%) and Dalmatian 1(0.8%). The results of Fine Needle Aspiration Cytology (FNAC) of malignant tumours were adenocarcinoma 19 (15.9%), osteosarcoma 14(11.8%), hemangiosarcoma 13(10.9%), sarcoma 10 (8.4%), Fibrosaroma 9 (7.6%), Lymphoma 7 (5.8%), hepatocellular Carcinoma 5(4.2%), leiomyosarcoma 4 (3.4%), squamous cell carcinoma 4 (3.4%), mammary gland adenocarcinoma 3 (2.5%), fibrosarcoma, mast cell tumour, mesothelioma, osteochondroma, perineal adenocarcinoma, steroli cell Tumour, transitional cell carcinoma and Uveal melanoma each 1 (0.8%). Lung metastasis was absent in 78(65.5%) and present in 41(34.5%) dogs. Computerized Tomography study revealed the presence of either regional or sentinel lymph node involvement and metastasis in 49 (41.2%) dogs and no involvement in 70 (58.2%) dogs.

Keywords: Carcinoma, incidence, canine malignant tumours, metastasis, dogs, Lung metastasis

Introduction
Tumour is defined as uncontrolled growth of cells. Incidence rate of tumours is increasing in human as well as veterinary medicine. Tumour is the major cause of death in dogs around 27%. In majority of cases caused relative death due to spread of primary tumour to distant site a process called metastasis. Nowadays due to modernization and urbanization, pets are reared for companionship, bonding and as stress buster so the pets and human are living in the same location, which leads to equal amount of chances developing cancer among pets and human. Most common tumour in dogs were found in skin followed by mammary tumours, hematopoietic system and soft tissue tumours (Brønden *et al*., 2010) [4]. Epidemiology studies of tumours described the correlation between the tumour and risk factors that affects the individual, genetically and environmentally (Fleming *et al*., 2011) [9]. Labradors, Golden retrievers, boxers and Rottweiler's were frequently affected than other breeds of dog (Dobson, 2013) [7]. The animal cancer registry of India is not established still now, the cancer registry will give the incidence and epidemiological studies of cancer in dogs and cats. This study was proposed to investigate the incidence of malignant tumours and their metastasis in dogs of in and around Chennai.

Materials and Methods
The study was carried out in the Small Animal Surgery Outpatient Unit of Madras Veterinary College Teaching Hospital, Chennai from January 2022 to December 2024. Around 10840 new cases were reported for various disease conditions *viz.*

Dog bite wound, infected maggot wound, hernia, gastric dilatation and volvulus, cystic and urethral calculi, otitis, aural hematoma and tumours. Tumours again classified in to benign and malignant based on FNAC (Fine Needle Aspiration Cytology). Incidence of malignant tumours were studied based on age, sex, body weight, neutered status and region wise affected. 119 dogs were diagnosed as malignant tumours. All the dogs were subjected to orthogonal view of thorax to study the lung metastasis, followed by plain Computerized Tomography (CT) to check the lung metastasis and identify the distant metastasis in the sentinel and regional lymph nodes.

Results and Discussion

Body weight of the dogs was 8 kgs to 65 kgs with mean body weight of 25.5kgs were noticed. Location of malignant tumours were classified in to region wise (Fig 1.) *viz,* head and neck, thoracic cavity, abdominal cavity and limbs. 57 dogs (47%) were affected in head and Neck region, abdomen 45 dogs (37.8%), thoracic cavity 9 dogs (7.5%) and limbs 8 dogs (6.7%), (Baioni *et al.*, 2017) [2]. Malignant tumours of head and neck were of high incidence rate followed by abdomen, thoracic whereas tumours of bone were of low incidence.

Sex wise distribution (Fig 2.) were 63 male dogs (52.95%) and 56 female dogs (47.05%). Male dogs were more incidence rate compare with female dogs, whereas other authors reported higher incidence in female dogs (Karnik *et al.*, 2020, Senthil *et al.*, 2020) [12, 13]. Age of the affected dogs were from 1 year to 14 years with mean age of 8 years and standard deviation of 3.4 years (Dhein ES, *et al,* 2024, Ishenbaeva *et al.*, 2024) [6, 11] reported mean age was 9 years. 0-3 years 16(13.4%), 4-6 years 19(15.9%), 7-9 years 33(27.7%), 10-12 years 41(34.4), 13-15 years 10(8.4%) were the age wise distribution (Fig 4.) of tumours in dogs. Senthil *et al.*, (2020) [13] reported the high incidence of malignant tumours in 5-10 years of dog. The incidence of malignant tumours increased as age increased in dogs. (Ishenbaeva *et al.*, 2024) [11] reported malignant tumours were most common in young dogs. In the present study dogs in the age group of 10-12 were most affected.

Breed wise distribution (Fig 3.) were Mongrel dog 35 (29.4%), Labradors 18 (15.1%), Golden Retrievers 13(10.9%), German Shepherd dog 9 (7.6%), Rottweilers 8 (6.7%), Spitz 8(6.7%), Doberman 7 (5.9%), Beagle 3(2.5%), Boxer 3(2.5%), Great Dane 3(2.5%), Chippiparai 2 (1.7%), Dachshund 2(1.7%), Pug 2 (1.7%), Siberian Husky 2 (1.7%), Terrier 2(1.7%), Shih Tzu 1(0.8%) and Dalmatian 1(0.8%). Mongrel dogs were high incidence (Senthil *et al.*, 2020) [13] compare with pure breeds of dog; it could be due overpopulation of mongrel dogs compare with others. (Karnik *et al.*, 2020) [12]. Arya, *et al.*, (2018) [1] reported pure breeds of dog were most commonly affected, but in the present study reported Mongrel dogs had higher incidence.

The results of Fine Needle Aspiration Cytology (FNAC) of malignant tumours were adenocarcinoma 19 (15.9%), osteosarcoma 14(11.8%), hemangiosarcoma 13(10.9%), sarcoma 10 (8.4%), Fibrosaroma 9 (7.6%), Lymphoma 7 (5.8%), hepatocellular Carcinoma 5 (4.2%), leiomyosarcoma 4 (3.4%), squamous cell carcinoma 4 (3.4%), mammary gland adenocarcinoma 3 (2.5%), fibrosarcoma, mast cell tumour, mesothelioma, osteochondroma, perineal adenocarcinoma, steroli cell Tumour, transitional cell carcinoma and uveal melanoma each 1 (0.8%) and the findings conquered with Baioni *et al.*, (2017) [2].

Lung metastasis (Fig 5.) was absent in 78(65.5%) and present in 41(34.5%) dogs as reported by (Baumann *et al.*, 2004) [3] who found 10% of malignant tumours metastasis in lungs. Plain Computerized Tomography study revealed the presence of either regional or sentinel lymph node involvement and metastasis in 49 (41.2%) dogs (Cordella *et al.*, 2022) [5]. The involvement of lymph node changes not noticed in 70 (58.2%) dogs Elissa Randall (2020) [8] also reported similar findings.

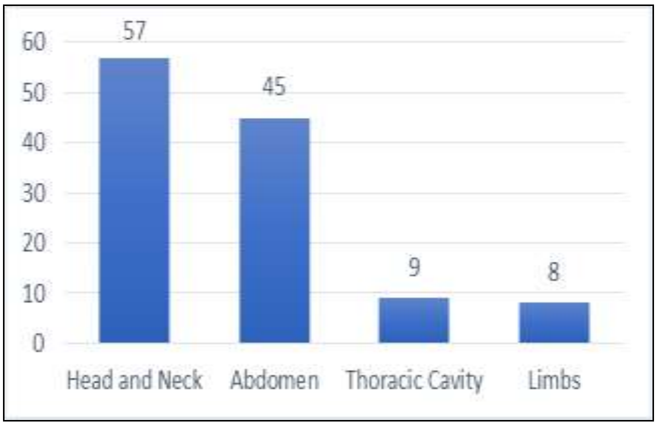

Fig 1: Region wise distribution of malignant tumours in dogs.

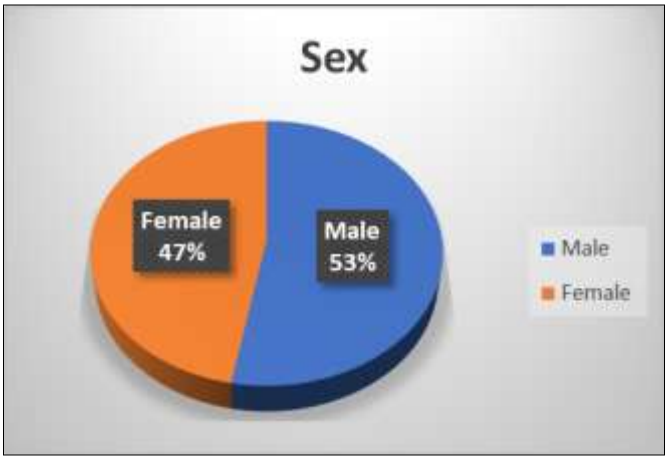

Fig 2: Sex wise distribution of malignant tumours in dogs.

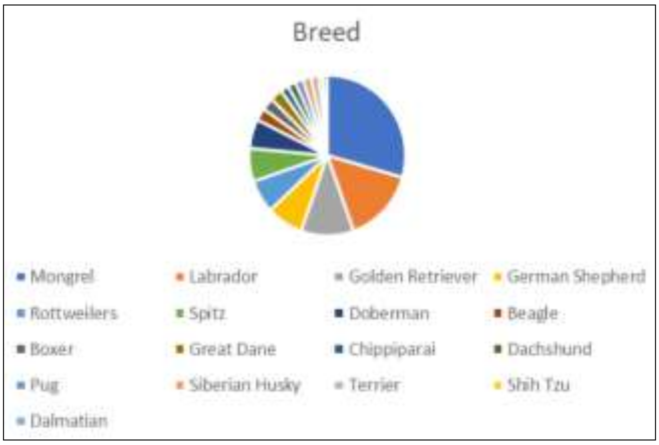

Fig 3: Breed wise distribution of malignant tumours in dogs.

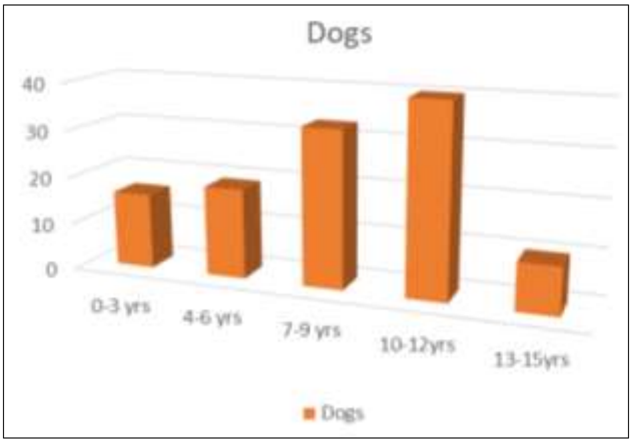

Fig 4: Age wise distribution of malignant tumours in dogs.

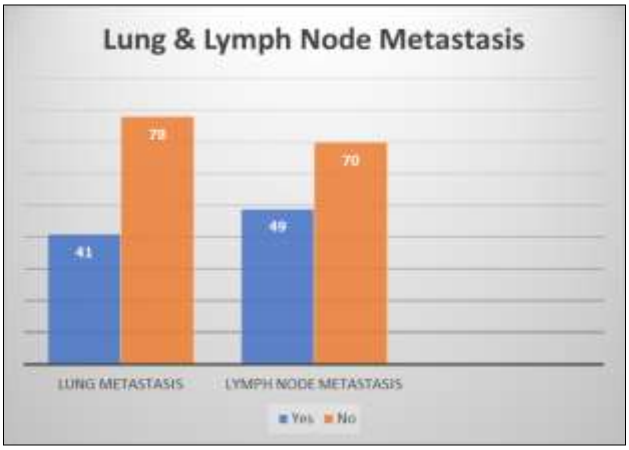

Fig 5: Lung and Lymph node metastasis of malignant tumours in dogs.

Conclusion
The present study revealed the Mongrel male dogs and in the age group of 10-12 years were more affected. FNAC revealed the more incidence of adenocarcinoma followed by osteosarcoma, hemangiosarcoma, sarcoma and fibrosarcoma. 34.5% of dogs with lung metastasis in radiography. Plain CT study revealed involvement of either regional or sentinel lymph node involvement only in 41.2% dogs.

Conflict of Interest
Not available.

Financial Support
Not available.

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