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Exploring the prevalence of vestibular disease in canines: A study in Chennai, India

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Abstract
The present study was conducted at Madras Veterinary College Teaching Hospital to report the prevalence of vestibular disease in canines. A total of forty-eight dogs showing clinical signs like head tilt, nystagmus, strabismus, loss of balance, vestibular ataxia, etc., which were presented to Madras Veterinary College Teaching Hospital formed the study group. Among forty-eight dogs screened, 26 animals showed signs suggestive of central vestibular disease while the other 22 animals showed signs suggestive of central vestibular disease which was confirmed based on CSF analysis, Total T_4 levels radiography, and computed tomography of the skull. The highest rate of disease was noticed in dogs of six to ten years of age group with 54.16 percent, while the commonest affected breed was Labrador with 29.16 percent. Male dogs had high incidence of 62.00 percent. Geriatric, males, Labrador dogs are more susceptible for vestibular disease.

Keywords: head tilt, CSF, vestibular disease

Introduction
Vestibular disease (VD) is identified by a malfunction in the nervous system responsible for maintaining equilibrium and balance. The diagnosis of VD hinges on specific neurological examination findings such as ataxia, head tilt, abnormal nystagmus, and strabismus. These distinctive clinical signs may stem from either central or peripheral neurological dysfunction. Neurological signs indicative of central involvement encompass deficits in proprioception, changes in mental status, cranial nerve deficits aside from CN VII or VIII, and vertical or dysconjugate nystagmus (Sanders, 2016) [8]. Recognizing these clinical signs aids clinicians in distinguishing between central and peripheral variants, which is pivotal in determining clinical management and deciding whether referral for advanced imaging is necessary. Among dogs presenting with peripheral vestibular disease (PVD), the most frequent diagnoses include otitis media/interna and idiopathic peripheral VD (IPVD). IPVD, notably, tends to occur more frequently in older dogs, and its diagnosis typically relies on the exclusion of other potential causes Kent *et al.*, (2010) [5]. On the other hand, central VD encompasses various causes, including anomalous, metabolic, neoplastic, infectious/inflammatory, traumatic, toxic, and vascular factors (Rossmeisl, 2010) [7].
Regardless of the etiology, VD can be a serious welfare concern for affected dogs. Clinical signs are often dramatic on presentation with severe disorientation causing distress for the affected animal and the owner Garosi (2012) [3], Bongartz *et al.*, (2020) [2]. Although vestibular disorders in dogs are reportedly common there are no reports which are available in India about the disease. Hence, the present study has been designed to investigate the occurrence, associated with vestibular disease in canine.

Materials and Methods
A total of forty-eight dogs with clinical signs like head tilt, nystagmus, strabismus, loss of balance, vestibular ataxia, etc., which were presented to Madras Veterinary College Teaching Hospital formed the study group. Detailed clinical, physical, and neurological examination of suspected cases was done. Blood samples were collected from suspected dogs under aseptic conditions from cephalic or saphenous veins and subjected to clinic pathological examination such as hematology and serum biochemical analysis.

A thin peripheral blood smear stained with Giemsa stain was observed under oil immersion objective for identification of *E. canis*. The serum was subjected to T_4 levels to diagnose hypothyroidism. CSF fluid was collected from patients and subjected to normal CSF analysis. Further, CSF samples were subjected to molecular diagnostic techniques such as conventional Polymerase Chain Reaction to confirm Canine distemper and *E. canis*-induced vestibular disease. Radiography and Computed tomography were performed to confirm otitis media/interna or neoplasia of the brain. Based on the hematology, CSF analysis, Thyroid levels, computed tomography, and radiography of skull animals were diagnosed and characterized as central and peripheral vestibular disease.

Results and Discussion

Among the forty-eight dogs presented with clinical signs such as head tilt, nystagmus, strabismus, loss of balance, and vestibular ataxia was screened 26 (54.1%) dogs diagnosed with central vestibular disease and 22 (45.83%) dogs diagnosed as peripheral vestibular disease based on hematology, CSF analysis, Thyroid levels, computed tomography, radiography of skull. The incidence of central vs peripheral occurrence of vestibular disease is presented in Figure 1. The total incidence of vestibular disease was 0.73 percent (48 among 6564 cases) among the total patients presented and 6.04 percent (48 among 794) neurological cases at Madras Veterinary College Teaching Hospital in 14 months.

The dogs screened in the present study were included in the age group ranging from six months to five years. Among the forty-eight dogs diagnosed as positive for vestibular disease by various tests, the highest rate of disease was noticed in dogs of six to ten years of age group with 54.16 percent, followed by 6 months to 6-year age group with 20.83 percent, 10 years and above with 18.75 percent, and less than 6 months of age 6.25 percent of occurrence. The age-wise occurrence of vestibular disease is presented in Figure 2. The findings of the present study are in agreement with the reports of authors Schunk (1983) [9], Schunk (1988) [10], Bongartz *et al.*, (2020) [2], and Radulescu *et al.*, (2020) [6]. Bagley *et al.*, (1999) [1] reported that the incidence of brain tumors, otitis interna, and idiopathic vestibular disease is higher in dogs older than 5 years leading to vestibular disease in canines. Radulescu *et al.*, (2020) [6] described in their study that regardless of the primary cause, VD should be considered a high-risk disease in older dogs.

Among the total of forty-eight dogs diagnosed with vestibular disease, 30(62%) dogs were males and 18(38%) dogs were females. Gender-wise occurrence of vestibular disease in canine is presented in Figure 3. Many of the researchers have documented that male dogs with outdoor access have a higher prevalence of ear infections, and tumors (Harrison *et al.*, 2020; Radulescu *et al.*, 2020) [4, 6].

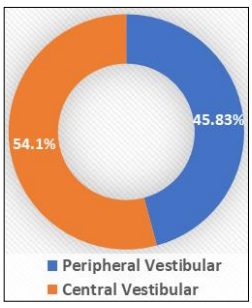

Fig 1: Incidence of Central vs Peripheral occurrence vestibular disease in dogs

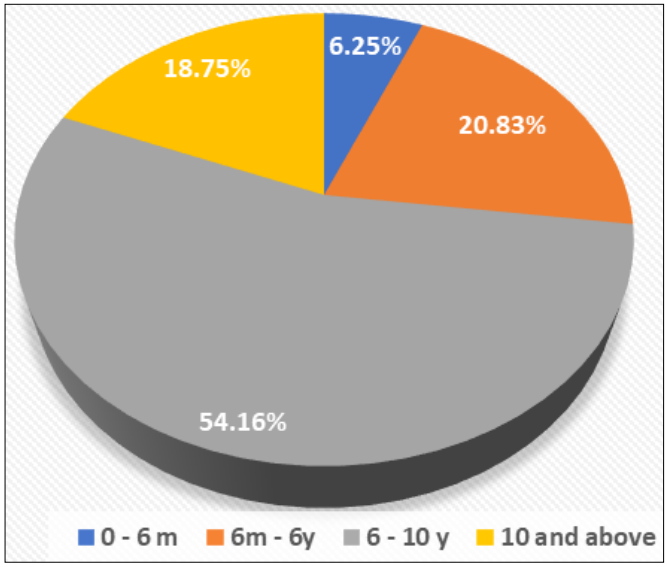

Fig 2: Age-wise occurrence of vestibular disease in canine

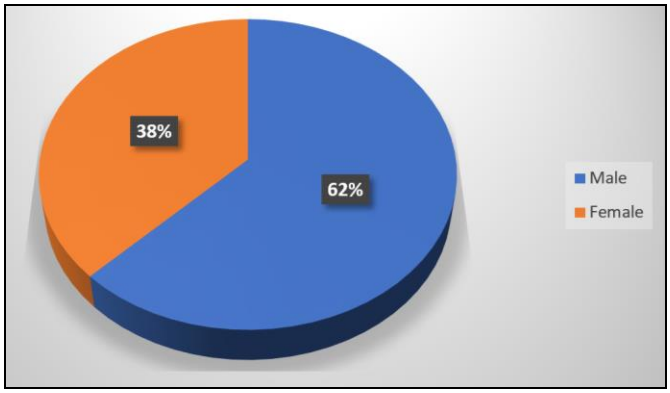

Fig 3: Sex-wise occurrence of vestibular disease in canine

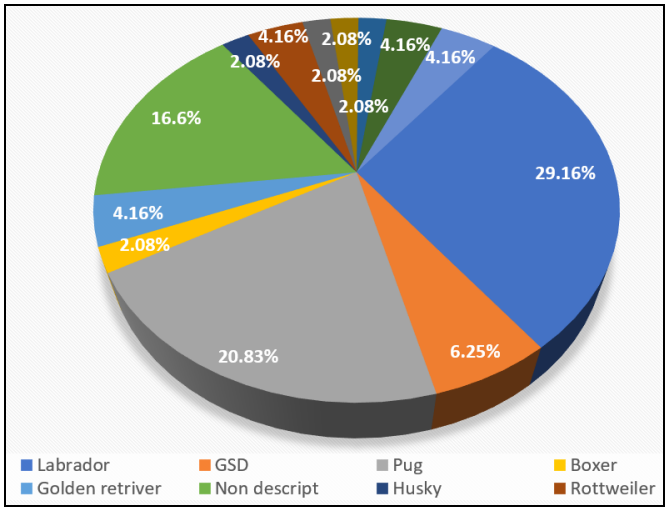

Fig 4: Breed-wise occurrence of vestibular disease in canine

In the present study, Labrador 14(29.16%), Pug 10(20.83%), non-descript 8(16.6%), German sphered 3(6.25%), Golden retriever, Rottweiler, Spitz, Doberman with each 2(4.16%) and Boxer, Siberian husky, French bulldog, Weimaraner, Chippiparai with 1(2.08%) were found diagnosed for vestibular disease. The breed-wise occurrence of vestibular disease is presented in Figure 4. Harrison *et al.* (2020) [4] and Radulescu *et al.* (2020) [6] observed a higher prevalence of vestibular disease among Labrador and pugs. The findings of the present study are in agreement with the reports of the above authors. The occurrence of vestibular disease in the

Labrador breed of dogs in the present study was higher and this could be due to the breed distribution of the canine population in Chennai. Schunk (1988) [10] reported that brachycephalic breeds such as pugs are reported to have a higher incidence of gliomas (brain tumors), idiopathic vestibular disease, and otitis media/interna that can cause vestibular disease.

Conclusion

Vestibular disease is one of the important neurological diseases that affect dogs and is a major threat to the well-being and welfare implications of the canine family. Geriatric, male, Labradors are highly susceptible to canine vestibular disease when presented with symptoms such as head tilt, nystagmus, strabismus, leaning, rolling, and falling on one side. Geriatric dogs with outdoor access should be routinely monitored for ear infections, trauma, hemoprotozoan diseases, and thiamine deficiency, to minimize risks of disease acquisition.

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