







Prevalence and clinical features of neurological disorders in dogs attended at Federal Rural University of Rio de Janeiro (2017-2018)

Caracterização clínica dos distúrbios neurológicos observados em cães atendidos na Universidade Federal Rural do Rio de Janeiro (2017-2018)

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ABSTRACT: Neurological disorders are frequent in small animal veterinary clinics and studies giving regional justification for such disorders are essential so that veterinarians can be better prepared. The objective of this retrospective study was to describe the clinical and epidemiological aspects of dogs with neurological disorders treated at the Veterinary Hospital of Federal Rural University of Rio de Janeiro, between August 2017 and April 2018. The study describes the location of the lesions and their etiology according to the acronym VITAMIN-D, as well as the distribution of cases according to sex, breed and age. One hundred and twenty-two (122) dogs were included, of which 58% (n=71) were males and 42% (n=51) females. The age distribution ranged from two months to 18 years old; 16% were less than two years old, 50% between two and seven years old and 34% were more than seven years old. The most affected breeds were Mixed Breed dogs (43%), Poodles (9%) and Dachshunds (7%). The diagnoses were confirmed in 54 animals (44%) and in 68 (56%) remained presumptive. The most common location was the spinal cord (61%), where the T3-L3 region was the most affected (35%), followed by multifocal (20%) and forebrain (10%). The most frequent categories were degenerative (24%), inflammatory/infectious (23%) and traumatic (20%) diseases. Intervertebral disc disease was the most observed, corresponding to 21.3% of all cases. The results showed that the neurological diseases in this Veterinary Hospital were more prevalent in young male adults with spinal cord diseases of degenerative nature.

KEYWORDS: Canines; Neurological diseases; Neuroanatomical location; Epidemiology.

RESUMO: Desordens neurológicas são frequentes na clínica de pequenos animais. Estudos caracterizando a casuística regional são fundamentais para melhor instrução e preparo técnico do médico veterinário. O objetivo deste trabalho retrospectivo foi descrever os aspectos clínicos e epidemiológicos de cães com distúrbios neurológicos atendidos no Hospital Veterinário da Universidade Federal Rural do Rio de Janeiro, entre agosto de 2017 e abril de 2018, caracterizando a localização da lesão e etiologia de acordo com o acrônimo VITAMINA-D, bem como a distribuição dos casos em relação ao sexo, raça e faixa etária. Foram incluídos 122 cães, com 58% (n=71) dos casos em machos e 42% (n=51) em fêmeas. A distribuição etária variou de dois meses a 18 anos, sendo 16% dos animais menores de dois anos, 50% entre dois e sete anos e 34% maiores de sete anos. As raças mais observadas foram SRD (43%), Poodle (9%) e Dachshund (7%). O diagnóstico etiológico foi confirmado em 54 animais (44%) e em 68 (56%) permaneceu como presuntivo. A localização mais comum foi na medula espinhal (61%), sendo a região entre T3-L3 a mais acometida (35%), seguida por multifocal (20%) e prosencéfalo (10%). As categorias mais frequentes foram de doenças degenerativas (24%), inflamatórias/infecciosas (23%) e traumáticas (20%). Dos cães com doenças degenerativas, a doença do disco intervertebral foi mais observada (21,3% do total dos casos). Com base nos resultados obtidos, pode-se concluir que, na casuística regional deste Hospital, as doenças neurológicas foram mais prevalentes em machos, adultos jovens e com localização medular de origem degenerativa.

PALAVRAS-CHAVE: Caninos; Doenças neurológicas; Localização neuroanatômica; Epidemiologia.

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INTRODUCTION

Primary or secondary neurological disorders are frequent in Small Animal Veterinary Clinics, but most available studies are based on case reports or retrospective studies of a particular disease (GAROSI et al., 2005; SNYDER et al., 2006; BRISSON, 2010, AIELLO et al., 2012, ARAUJO et al., 2017). Neurological disorders are significantly influenced by geographic locality, due to the prevalence of infectious agents, the most frequent breed, as well as the socioeconomic characteristics of the local population.

Data on variations of the geographic locality and its influence on the incidence of neurological disorders in dogs are scarce in Brazil (CHAVES et al., 2014). This lack of data hinders the ability to define the specialties needed in a Small Animal Veterinary Clinic. In order to understand the main diseases of a given locality, it is essential to carry out retrospective and prospective studies. The results of which will enable the prevalence of diseases according to species, sex, age, and breed in the region, to be defined.

The aim of this retrospective study was to describe the location of the lesions and their etiology, according to the acronym VITAMIN-D, of dogs with neurological diseases treated at the Small Animal Veterinary Hospital of UFRRJ, from August 2017 to April 2018. In addition, the distribution of cases according to sex, breed and age of the affected animals are described.

MATERIAL AND METHODS

The study was carried out retrospectively from the medical records of dogs treated between August 2017 and April 2018 at the Small Animal Veterinary Hospital of UFRRJ. The study included dogs with neurological signs who had undergone specific evaluations and had a full neurological examination form duly filled out with all the epidemiological data necessary. Only dogs with a complete neurological medical record were included.

Dogs were categorized according to their age as young (up to two years old), adults (between two and seven years old) and elderly (over seven years old); and according to their breed and sex.

Data from the medical records of the dogs, including the neurological examination and ancillary diagnostic tests (CSF analysis; survey radiography and computed tomography; serology and PCR) were collected to establish the neurolocalization of the diseases. Data were categorized into the following regions: forebrain; brainstem; cerebellum; spinal cord (cervical C1-C5, cervicothoracic C6-T2, thoracolumbar T3-L3 and lumbosacral L4-S3); peripheral nerves; neuromuscular and multifocal (when clinical signs suggested involvement in more than one neuroanatomical region). Based on the records of a confirmed or presumptive diagnosis, the conditions were categorized using the acronym VITAMIN-D, and described as vascular (V), inflammatory/infectious (I), traumatic or toxic

(T), anomalous (A), metabolic (M), idiopathic (I), neoplastic or nutritional (N) and degenerative (D).

The diagnosis was classified as “confirmed”, when the condition was confirmed through specific ancillary diagnostic tests, or “presumptive”, when differential diagnosis was used based on history, progression, exclusion of other conditions or response to the drug therapy prescribed. In cases of death in which the diagnosis was not confirmed, suspicion and presumptive diagnosis were maintained.

The results obtained were analyzed using descriptive statistics and a correlation between signalment (breed, age and sex), the categories of the acronym and the main conditions observed was carried out.

RESULTS AND DISCUSSION

During the nine-month study period, 3.339 dogs were treated at the Small Animal Veterinary Hospital of UFRRJ, of which 194 (5.8%) presented with neurological symptoms. Seventy-two dogs did not have a complete neurological evaluation form and were therefore excluded. A total of 122 cases met the inclusion criteria and were included in this study.

Neurological disorders were slightly higher in male dogs with 71 (58%) of the cases and 51 (42%) cases in females. The age distribution ranged from two months old to 18 years old with a mean of 6.3 ± 4.5 years old. Nineteen (19) dogs (16%) were under two years old, 61 (50%) were between two and seven years old and 42 (34%) were over seven years old (Table 1).

There was a large variety of breeds among the dogs even though 52 dogs (43%) were mixed breed dogs (MBD). The remaining 70 dogs were categorized into 27 different breeds, and the main breeds were Poodle (9%), Dachshund (7%), French bulldog (6%), Yorkshire terrier (5%) and Pit

Table 1. Epidemiological characteristics of dogs with neurological diseases seen at the Small Animal Veterinary Hospital of UFRRJ, between August 2017 and April 2018.

Characteristics	Total (n= 122)	Percentage
Breeds		
<i>Mixed-breed</i>	52	43%
<i>Poodle</i>	11	9%
<i>Dachshund</i>	9	7%
<i>French bulldog</i>	7	6%
<i>Yorkshire Terrier</i>	6	5%
<i>Pitbull</i>	5	4%
Age (years)	$6,3 \pm 4,5$	-
<i>puppy (<2 years)</i>	19	16%
<i>adult (2-7 years)</i>	61	50%
<i>elderly (>7 years)</i>	42	34%
Sex		
<i>Male</i>	71	58%
<i>Female</i>	51	42%

bull (4%). The low socioeconomic characteristics of the region (IBGE 2015) where the Veterinary Hospital is located may explain the high percentage of mixed-breed dogs because many of the animals in this region are rescued from shelters or adopted by Non-Governmental Organizations (NGOs).

The etiological diagnoses were confirmed in 54 animals (44%) and in 68 (56%) remained presumptive. Specific ancillary tests were performed in less than half of the cases and most of them were not performed due to financial restrictions or non-cooperation of the owners. Other limiting factors were the lack of magnetic resonance imaging (MRI), which is the imaging modality of choice to diagnose most neurological diseases in humans and veterinary patients (HECHT, 2018) and some diagnoses are exclusively post-mortem. The sum of these three factors explains the relatively high percentage of presumptive diagnoses in this study, although similar to those described by Fluehmann et al. (2006) and Chaves et al. (2014), who obtained 68.2% and 55.6% of presumptive diagnoses in their studies, respectively.

The anatomical location of the neurological diseases was established in all 122 dogs (Figure 1). The most common

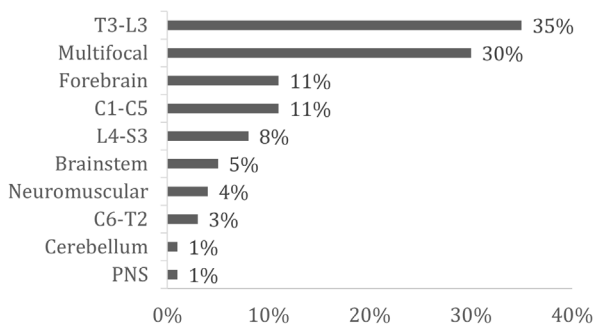


Figure 1. Distribution of the location of the neurological diseases in dogs treated at the Small Animal Veterinary Hospital of UFRRJ, between August 2017 and April 2018. PNS, peripheral nervous system.

location was the spinal cord (75 cases; 61%) with thoracolumbar region being the most affected (43 cases, 35%), followed by cervical region (14 cases, 11%), lumbosacral (10 cases, 8%), cervicothoracic (4 cases, 3%) and multifocal (4 cases, 3%). Multifocal, forebrain and brainstem lesions corresponded to 20% (n=25), 10% (n=13) and 5% (n=6) of the cases, respectively. Neuromuscular diseases accounted for 4% (n=5) of the cases and only 1% (n=1) of the cases was located in the peripheral nervous system and cerebellum. Other authors (FLUEHMANN et al., 2006, CHAVES et al., 2014) have also described a high prevalence of spinal disorders.

Figure 2 gives the classification of the neurological diseases according to the acronym VITAMIN-D for all dogs. The most common disease category diagnosed was degenerative (n=29) followed by inflammatory/infectious (n=28), similar to those observed by Fluehmann et al. (2006) and Chaves et al. (2014). The frequencies of the other categories were traumatic (n=24), neoplastic (n=20), vascular (n=8), idiopathic (n=6), toxic (n=5), anomalies (n=2) and metabolic (n=1).

Table 2 shows the correlation between the location and the categories of neurological disorders. Notably, the location

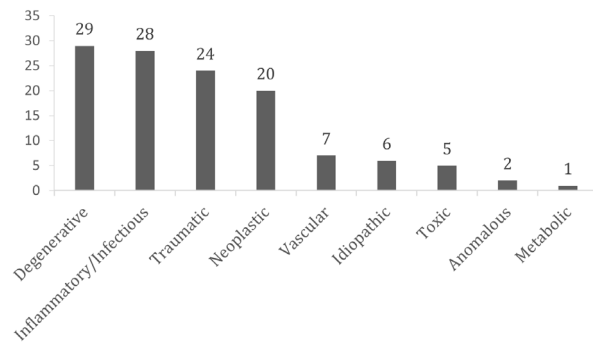


Figure 2. Distribution of neurological diseases categories according to the acronym VITAMIN-D in dogs treated at the Small Animal Veterinary Hospital of UFRRJ, between August 2017 and April 2018.

Table 2. Cross-table of location and categories of the neurological diseases in dogs seen at the Small Animal Veterinary Hospital of UFRRJ, between August 2017 and April 2018.

	Degenerative	Inflammatory/Infectious	Neoplastic	Anomalous	Metabolic	Idiopathic	Traumatic	Toxic	Vascular	TOTAL
Multifocal	2	14	4	0	0	1	4	0	0	25
Forebrain	2	0	3	1	1	4	0	1	1	13
Cerebellum	0	0	0	0	0	0	0	0	1	1
Brainstem	0	3	1	0	0	0	0	0	2	6
C1-C5	6	2	4	0	0	0	2	0	0	14
C6-T2	1	0	3	0	0	0	0	0	0	4
T3-L3	17	3	4	0	0	0	16	0	3	43
L4-S3	1	6	1	0	0	0	2	0	0	10
PNS	0	0	0	0	0	1	0	0	0	1
Neuromuscular	0	0	0	1	0	0	0	4	0	5
TOTAL	29	28	20	2	1	6	24	5	7	122

with the highest incidence of disorders - the spinal cord - also had the highest prevalence in the most diagnosed category - the degenerative category. Thus, out of 122 cases studied, 21.3% (n=26) corresponded to degenerative spinal cord disorders, and all these cases were related to intervertebral disc disease (IVDD).

Out of the 26 dogs diagnosed with IVDD, 11 (42%) had a confirmed diagnosis with computed tomography and for the other 15 (58%) the diagnosis remained presumptive. The majority of the lesions (65%; n=17) were in the T3-L3 region and 23% (n=6) were in the C1-C5 region, corroborating the data described in the literature (DEWEY; DA COSTA, 2016, FENN et al., 2020). Chondrodystrophic breeds such as Dachshund (n=5) and French bulldog (n=5) and the age group between two and seven years old (58%) were more affected by IVDD, which indicates a greater predisposition of these breeds to this disorder compared to non-chondrodystrophic breeds (JENSEN; ARNBJERG, 2001, SMOLDERS et al., 2013, KRANENBURG et al., 2013, MAYOUSSE et al., 2017). Furthermore, there was a higher prevalence of males with IVDD than females (69% and 31% respectively) and, although there is no reported sex predisposition, other studies have shown that males are more likely to develop IVDD than females (BRISSON, 2010).

In addition, notably in the spinal cord region, there was a high incidence of traumatic disorders (21 cases, 17%), predominantly in MB dogs (n=15) and young adults (3 ± 2 years). Among the 21 dogs that had spinal cord trauma, 15 had been run over by motor vehicles, which was the main cause corresponding to 71% of the cases. The thoracolumbar region (n=16) was the most affected location, as also mentioned by Araújo et al. (2017) and Pereira et al. (2019) who demonstrated that the most traumatic injuries in dogs are located in the spinal cord segment mentioned above. The high incidence observed in this study is probably related to regional characteristics, such as the high number of stray animals, roads with heavy traffic and the owners care after their animals that were free to roam the local area.

Discocondylitis (n=7) was the most diagnosed inflammatory/infectious myelopathy (n=12), and corresponded to 58% of the cases. The diagnosis was confirmed in 4 dogs (57%) and remained presumptive in 3 (43%). According to Bukert et al (2005), this disease is more common in young and middle-aged dogs, especially for large breeds and males, as seen in this study, where 71% (n=5) of the cases were in males, aged between two and seven years old. Labradors (28%) and MBD (28%) were the most affected breeds. Regarding location, 71% (n=5) of cases occurred in the L4-S3 region and 29% (n=2) in the T3-L3 region, which are the most commonly affected lesion sites agreeing with various other authors (THOMAS, 2000, BUKERT et al., 2005, TIPOLD; STEIN, 2010).

Another correlation that stands out in this study is the inflammatory/infectious diseases with a multifocal location (n=14, 11.5% of the total number of cases), with an equal

distribution between sex (50% males and 50% females). The mean age was 6 ± 4 years old and the most affected animals were MBD (n=10). The most prevalent disease was canine distemper (64% of the cases, n=9), with 55% of the animals with a confirmed diagnosis and 45% with a presumptive diagnosis. This disease is the most common cause of encephalitis in young and adult dogs (HEADLEY; GRAÇA, 2000, SILVA et al., 2007, DEWEY; DA COSTA, 2016), however, the average age (6 ± 4 years old) found in this study was higher than reported in the literature (DEWEY; DA COSTA, 2016). In this study, 44% of the animals were between 2 and 7 years old, 33% were over 7 years old, and 22% were under 2 years old. Furthermore, since distemper is a disease that affects several organic systems, animals with clinical respiratory and gastrointestinal signs associated or not with neurological dysfunction were referred to the Infectious Diseases Service, and were not included in this study. Thus, the regional specificity of this disorder described in this study is underestimated; however, the weight of this disease is still highlighted as a differential diagnosis, especially when the neurolocalization is multifocal.

Among forebrain disorders (n=13), the most frequent disease category was idiopathic (n=4). All cases observed were related to idiopathic epilepsy, corresponding to 30.8% of the cases, with equal distribution between sex (50% males and 50% females). Animals aged between two and seven years old were the most affected (75%), corroborating Dewey & Da Costa (2016), who stated that the first signs in dogs is usually between one and five years old. A genetic basis for this disease has been reported for some dog breeds, such as Poodle, Beagle, Labrador and Golden Retriever (THOMAS, 2010), however 75% (n=3) of dogs diagnosed with idiopathic epilepsy in this study were MBD, which is similar to the results found by Aiello et al (2012).

Notably there were 4 cases of botulism (3.3% of the total), which is a neuromuscular disease caused by the ingestion of botulinum toxin, and is considered rare (AÑOR, 2014). All cases were in male dogs with access to the street, with an average age of 6 years old.

The prevalence of diseases of the nervous system is determined by several factors, such as age, breed, sex and geographic locality and cultural factors, so that different regions and localities will show a varied prevalence of diseases. Information about the characteristics of neurological disorders in distinct geographic localities would help to understand the regional variations of these disorders. Thus, a regional database showing the frequencies and distribution of neurological diseases would help the clinician draw up a list of possible diagnoses, request any additional tests needed for such prognoses, and thus be better prepared for more appropriate treatments and methods of prevention.

In this study, we can infer that prophylactic measures such as vaccination against distemper and preventing these animals free access to the streets in this locality could lead to a significant decrease in the number of these nervous system diseases. In addition, this study demonstrated that the use

of specific complementary exams is essential to confirm the diagnosis of such diseases as found here.

CONCLUSION

The results showed that neurological diseases were more prevalent in male dogs, aged between two and seven years old; mixed breed dogs (MBD), Poodles, Dachshunds and

French bulldogs were the most affected. The most affected locations were the spinal cord between the T3 and L3 segments, followed by multifocal lesions. The main categories of neurological diseases observed were degenerative, inflammatory/infectious and traumatic, with intervertebral disc disease (IVDD), distemper and motor vehicle accidents as the most common causes.

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