



Epidemiological Valuation of Renal Diseases in Dogs in and Around Guwahati Region of Assam, India

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ABSTRACT

Renal disease is one of the most common and fatal condition occurring in dogs. Only few reports are available on the prevalence of renal diseases in dogs in India in general and in Assam in particular. The present study was intended to report the prevalence of renal diseases in dogs registered at Veterinary Clinical Complex, Guwahati, Assam over a period of 5 years. The study was conducted on all the dogs registered at veterinary clinical complex, college of veterinary science, Khanapara from January 2018 to December 2022. The dogs were screened for renal diseases on the basis of patient's history, clinical signs and symptoms; and were confirmed for renal diseases on the basis of haemato-biochemical analysis, urinalysis and diagnostic study (imaging techniques like radiography and ultrasonography). The overall prevalence of renal disorder in dogs was found to be 2.74%. The breed-wise occurrence of renal disorder was found to be highest in Labrador retriever (29.71%) followed by non-descript breed (17.22%). The sex-wise occurrence was found to be higher in males (60.08%) than female dogs (39.92 %). Highest occurrence of renal disease was observed in the age group of >6-10 Years (31.74%) followed by age group of >3-6 Years (26.38%). The present study evaluated the prevalence of renal diseases in dogs in and around Guwahati region. The highest occurrence of renal disorder was observed in Labrador dogs while English pointer is the least affected one amongst all the breeds. The occurrence of renal disorder in dogs was found to be increased with the advancement of age. Male dogs are more prone to renal disorder compared to female dogs.

Key words: Age, Breed, Occurrence, Prevalence, Renal disorder, Sex.

Renal disease can be defined as a heterogeneous group of disorders in which one or both the kidneys lose their normal structure and function, which may be due to external or internal factors like infections, diabetes, autoimmune diseases, cancer, other endocrine disorders and toxic chemicals (Levey *et al.*, 2013). It is characterized by the reduction in the excretory, regulatory and storage functions of the kidney. It is recognized now that even minor abnormal change in measures of kidney structure and function is associated with increased risk for development of other organ and system complications as well as mortality all of which occur far more frequently than kidney failure.

Renal disease is characterized by rapid onset of renal insufficiency within a week to 3 months or more, which results in inability of the kidneys to perform its normal functions like excretion, maintenance of homeostasis, perform biosynthetic endocrine function *etc.* (Chawla *et al.*, 2020). This results in clinical manifestations such as depression, listlessness, vomiting, anorexia, diarrhoea, dehydration, uremic gastritis along with changes in the urine output.

Renal disease in dogs is considered as one of the leading causes of death and about 2-5% of dogs suffer with renal disease (Lund *et al.*, 1994). The prevalence is higher in geriatric dogs, with chronic renal insufficiency reaching a peak prevalence of 10% in veterinary clinical patients (Polzin *et al.*, 1992). This might be due to increased urbanization and environmental pollution, unsanitary feeding and indiscriminate use of therapeutic agents. The variations in the occurrence could be due to several extrinsic

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factors like variations in geographical, environmental and managerial practices.

Now a days, the awareness among the pet owners as well as availability of advance diagnostic tools and therapeutic interventions make it possible to recognize the disorders related to renal function systematically. However, detailed reports on the occurrence of renal diseases in dogs of Assam are not available. Hence, the present study was conducted to record the occurrence of renal diseases in dogs that were presented to the Veterinary Clinical Complex, College of Veterinary Science, Khanapara, Guwahati, Assam.

Ethics statement

The study was conducted on dogs bought to Veterinary Clinical Complex, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India for routine diagnostic examination. Therefore, it does not require the approval from the Institutional Animal Ethics Committee.

Animals

The present study was carried out on all the dogs registered at Veterinary Clinical Complex, from January 2018 to December 2022. Dogs presented with the history and symptoms of chronic vomiting irrespective of food and water intake, inappetence, anorexia, halitosis, oral ulcerations, variation in mucous membrane colour ranging from pale to congested, gastritis, loose and blackish stool, changes in urine output and urine frequency, dehydration, lethargy, weight loss etc. were screened for renal diseases. Dogs having haemoprotzoan infections (*Babesia gibsoni* and *Ehrlichia canis*) and bacterial infections (*Leptospira* species) were also screened for renal diseases. During the study period, a total of 1,67,077 dogs were registered, out of which 17,999 were screened for renal diseases on the basis of patient's history and on the above-mentioned clinical signs and symptoms. Furthermore, the suspected dogs were subjected to routine urine analysis, haemato-biochemical analysis and diagnostic study (imaging techniques like radiography and ultrasonography) for confirmatory diagnosis of renal diseases. The occurrence of renal failure was recorded with respect to breed, sex and age.

Study period

The present study was conducted for a period of 5 years *i.e.* from January 2018 to December 2022 at Veterinary Clinical Complex, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India.

Prevalence rate

The retrospective study of prevalence of renal diseases in dogs presented for the last five years (1st January 2018 - 31st December 2022) was performed on the basis of breed, Sex and Age.

Prevalence of renal disease was calculated by the following formula:

Prevalence (%) =

$$\frac{\text{Total number of renal diseases presented}}{\text{Total Population at risk of developing the disease}} \times 100$$

Statistical analysis

Statistical analysis was done using The GraphPad Prism Version 10.0 for Windows, GraphPad Software, La Jolla California USA, www.graphpad.com. Differences were considered to be significant at $P < 0.05$ and $P < 0.01$. The differences between the groups were analysed by "Chi-square test".

Renal failure is the one of the most common and fatal condition occurring in dogs. The etiological factors involved in dogs affected with renal failure were urolithiasis, leptospirosis, pyometra and many other unknown causes (idiopathic).

During the study period, a total of 1,67,077 dogs were registered, out of which 4,594 dogs were confirmed for renal diseases. The overall prevalence of renal disorder was found to be 2.74 % for the said period (Fig 1). The prevalence of renal diseases was found to be highest in the year 2021 followed by year 2022 and lowest in the year 2018.

In this retrospective study, the prevalence rates of renal disease were found to be following an increasing trend with the advancement of time *i.e.* from year 2018 to 2021. However, the prevalence of renal disease in year 2022 was found to be slightly lower than the prevalence rate observed in year 2021 (Fig 2). This may be due to development of more specific diagnostic protocols as well as due to the increasing awareness among the dog owners regarding their pet's healthy lifestyle. These findings were consistent with earlier finding (Tufani *et al.*, 2017) whereas other researchers reported slightly higher overall occurrence of renal diseases in dogs as 3.48% and 4.84% (Chawla *et al.*, 2020) respectively.

The variation observed in prevalence rates in different studies might be due to variations in geographical area considered for the study, population size as well as on the variations in the period of study.

Breed-wise occurrence

The study period includes many different breeds, amongst them, the occurrence of renal disorder was found to be highest in Labrador retriever (29.71%) breed followed by non-descript breed (17.22%) and lowest in English pointer (0.04%) followed by Shitzu (0.09%) and American bulldog (0.13%) (Table 1). In this study the calculated chi-square value was 132.50 at a significance level of 1% ($p < 0.001$) for the years 2018-2022. Similar findings were reported by various researchers who reported the highest prevalence of renal diseases in Labrador Retriever breed of dogs (Tufani *et al.*, 2017; Nabi *et al.*, 2018; Chaitanya *et al.*, 2020;

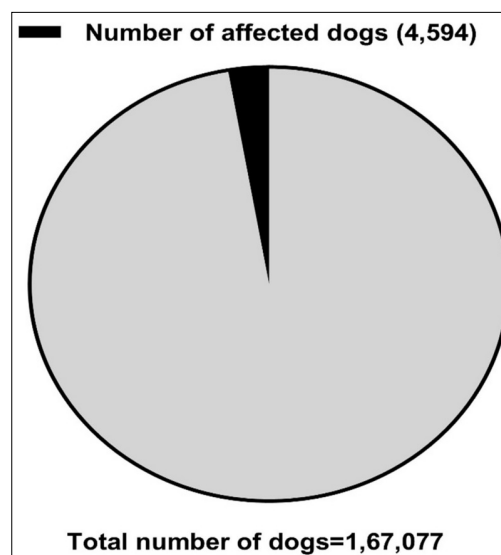


Fig 1: Pie diagram showing prevalence of renal disorders in dogs from January 2018 - December 2022.

Chawla *et al.*, 2020; Sahu *et al.*, 2021; Ahmad *et al.*, 2023 and Bilwal *et al.*, 2024) and also highest prevalence of chronic kidney disease in Labrador Retriever breed of dogs (Reddy *et al.*, 2021). These findings were inconsistent with other findings that report highest occurrence of renal diseases in Pomeranian breed followed by Labrador retriever (Karunanithy *et al.*, 2019); and highest prevalence (28.20%) of renal disorders in the breeds of Spitz (Thade *et al.*, 2019).

The variation in breed wise occurrence of renal disease may be due to prevalence of particular breed of dogs in a particular geographical area.

Sex-wise occurrence

The occurrence of renal disease was found to be higher in males (60.08%) than female dogs (39.92%) and the female: male ratio ranges from 1: 1.26 to 1: 1.79. The overall female: male ratio is found to be 1: 1.50 ratio for the years 2018 to 2022 (Table 2) and the calculated chi-square value was 20.27 at a significance level of 1% ($p < 0.001$) for the years 2018-2022. This finding was in accordance with other reports (Tufani *et al.*, 2017; Chawla *et al.*, 2020; Kumar

et al., 2020; Meena *et al.*, 2022; Ahmad *et al.*, 2023 and Bilwal *et al.*, 2024).

Higher occurrence of renal diseases in males may be due to anatomical differences in kidneys (size and volume)

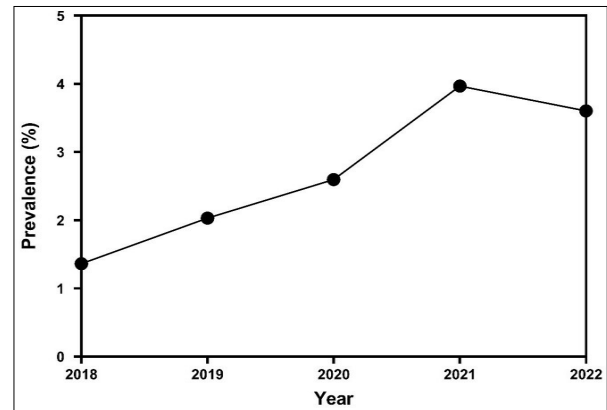


Fig 2: Prevalence of renal disorders in dogs from January 2018-December 2022.

Table 1: Breed wise occurrence of renal diseases in dogs.

Breed	Year					Total confirmed cases
	2018	2019	2020	2021	2022	
Labrador retriever	154	202	241	385	383	1365
Pomeranian	14	11	7	31	31	94
Pug	11	5	16	21	19	72
Non- descript	75	94	125	265	232	791
Cross breed	55	65.00	74	169	164	527
German shepherd	35	76.00	93	132	128	464
German spitz	33	72.00	90	176	176	547
Golden retriever	15	30.00	33	65	66	209
Rottweiler	6	20.00	15	21	20	82
Saint bernard	6	11.00	8	11	13	49
Lasha apsu	10	15.00	12	21	22	80
Dalmatian	20	15.00	12	10	10	67
Doberman	6	9	4	6	7	32
Boxer	6	5	7	10	10	38
Bull mastiff	6	6	6	8	7	33
Other breeds (rare in Assam)	6	13	25	47	53	144
Other						
Breeds						
(less						
frequently						
reported in						
Assam) =						
10 breeds						
Beagle	2	2	6	7	4	21
Cocker spaniel	-	3	2	15	18	38
Shitzu	-	1	1	1	1	4
Siberian husky	-	1	2	4	3	10
Daschund	-	-	-	4	7	11
Belgium shepherd	-	-	4	8	11	23
English pointer	-	1	1	-	-	2
Yorkshire terrior	2	1	5	4	4	16
Pitbull	3	1	4	5	13	-
American bulldog	2	1	3	-	-	6
Total	458	649	768	1378	1341	4594

$\chi^2 = 132.50$ (df 60) at a significance level of 1% ($p < 0.001$, 0.0001), (χ^2 = Chi-square and df = Degrees of freedom).

The chi-square test is performed on different groups of dogs on the basis of breeds. However, one group called "other breeds (less frequently reported in Assam)" is formed by combining 10 breeds as it is required for performing Chi-square test.

Table 2: Sex-wise occurrence of renal diseases in dogs.

Sex	Year					Total
	2018	2019	2020	2021	2022	
Female	180	253	340	600	481	1834
Male	278	396	428	778	860	2760
Female : male	1: 1.54	1: 1.57	1: 1.26	1: 1.29	1: 1.79	1: 1.50

$\chi^2 = 22.64$ (df 4) at a significance level of 1% ($p < 0.0001$); (χ^2 = Chi-square and df = Degrees of freedom).

Table 3: Age-wise occurrence of renal diseases in dogs.

Age	Year					Total
	2018	2019	2020	2021	2022	
≤ 1Year	17	55	51	99	90	312
> 1-3 years	69	153	207	318	319	1066
>3-6 Years	132	171	203	377	329	1212
> 6-10 Years	167	185	228	431	447	1458
> 10 Years	73	85	79	153	156	546
Total	458	649	768	1378	1341	4594

$\chi^2 = 47.80$ (df 16) at a significance level of 1% ($p < 0.001, 0.0001$); (χ^2 = Chi-square and df = Degrees of freedom).

as well as in urinary tract of male which helps in advancement of the disease. Due to anatomical differences in urinary tract, male dogs are more prone to urolithiasis and prostate diseases where an inflamed prostate gland affects the normal flow of urine. Moreover, male dogs known to have higher blood pressure than the females which might also be responsible for its higher prevalence. One of the reasons for higher occurrence of renal diseases in male dogs may be due to preference of dog owners towards male dogs as pets. However, some researchers reported higher occurrence of the disease in females than males (Nabi *et al.*, 2018 and Chaitanya *et al.*, 2020).

Age-wise occurrence

The dogs in the age group of > 6-10 Years (31.74%) were mostly affected with renal disorders followed by age group of >3-6 Years (26.38%) and the dogs of age group ≤ 1Year (6.79%) were least affected during the entire period *i.e.* from January 2018 to December 2022 (Table 3). The Calculated chi-square value was found to be 47.80 at a significance level of 1% ($p < 0.001, 0.0001$) for the years 2018-2022. Various researchers have reported higher occurrence or prevalence of renal diseases in older dogs (Reddy *et al.*, 2021; Sahu *et al.*, 2021; Ahmad *et al.*, 2023 and Bilwal *et al.*, 2024). This could be attributed to the loss of functional nephrons of the kidney and reduced renal blood flow with the advancement of age (Polzin *et al.*, 1992 and Sahu *et al.*, 2021). Moreover, older dogs often have other age-related issues that may play a role in leading them to renal disorders. However, the occurrence of renal diseases in dogs of age group >10 years is comparatively lower than the other age groups except puppies because only a small percentage of dogs of above 10 years of age were registered during the study period.

CONCLUSION

On the basis of present study that is conducted on renal diseases in dogs from January 2018 to December 2022 at

Veterinary Clinical Complex, Guwahati, Assam, it can be concluded that Labrador Retriever is the most affected breed of dogs and English pointer is the least affected one amongst all the breeds. Occurrence of renal diseases was found to be more in male dogs compared to females and in older dogs of age group > 6 -10 years. The overall prevalence of renal diseases in dogs was observed as 2.74%.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

The present study involved client-owned dogs that were brought to the Veterinary Clinical Complex, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India, for routine diagnostic purposes. As such, approval from the Institutional Animal Ethics Committee was not necessary.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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