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Influence of Age Breed and Sex on Incidence of Renal Disorders in Dogs

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ABSTRACT

Background: Kidneys play an essential role in health, disease, and growth. Renal disorders are among the most common ailments of dogs and contribute substantially to canine mortality, particularly in older dogs. Fewer published reports are documenting the prevalence of renal diseases in dogs in India. The current study was undertaken to find out the incidence of renal disorder in dogs based on their age and breed and sex.

Methods: The assessment of the incidence of renal disorders in dogs was done in the clinical cases reported at Referral Veterinary Polyclinic, IVRI during the period *i.e.* February 2010 to January 2011. The total numbers of 880 cases of dogs suffering from different ailments were reported during this period, out of which 63 dogs were suspected and screened for renal disorders based on clinical signs, ultrasonographic findings, serum and urinary biochemical alterations and urine analysis.

Result: The overall incidence of renal disorders was 7.15% recorded according to the age of dogs. No renal disorders were detected in the dogs < 6 years of age. 3.26% dogs of 6-8 year age group were confirmed for kidney diseases. Whereas 9.30% and 13.94% dogs in the age groups of 8 -10 year and ≥10 years, respectively had renal disorders. The breed wise renal disorders in dogs showed the highest incidence in Labrador dogs followed by Bulldogs, Dalmatian, Great Dane and Rottweiler, Doberman, German Shepherd and Pomeranian. Interestingly lowest incidence was recorded in the mixed or non-descript breed. Out of 63 dogs, 36 male (57%) and 27 female (43%) dogs were confirmed for renal disorders indicating a higher prevalence of renal diseases in males than females.

Key words: Age, Breed, Disorder, Dogs, Incidence, Renal, Sex.

INTRODUCTION

Kidneys are paired vital organs, which play an essential role in health, disease and growth. These are the complex organs with many functions. Renal disorders are among the most common ailments of dogs and contribute substantially to canine mortality, particularly in older dogs. In a survey, the Australian veterinary practitioners reported 1-2 cases per two weeks of renal disorders in dogs. (Watson *et al*., 2001). A British survey indicated that 0.2% of dogs were presented with suspected renal diseases, out of which 25% were confirmed. There was no evidence of breed or sex predisposition (Mac Dougall *et al*., 1986). However, the frequency of renal disorders in dogs increases with age and nearly 15% of dogs above 10 years were reported to have renal diseases (Polzin *et al,* 1989). Fewer published reports are documenting the prevalence of renal diseases in dogs in India (Mrudula *et al*., 2005; Ponnuswamy *et al.,* 2009). Hence, a preliminary study was carried to find out the incidence of the renal disorder in dogs at Referral Veterinary Poly Clinic, IVRI, Izatnagar, Bareilly, India.

MATERIALS AND METHODS

Clinical cases of dogs reported at the Referral Veterinary Polyclinic, Indian Veterinary Research Institute during the period from February 2010 to January 2011 were investigated for the presence of renal disorders based on clinical signs, biochemical changes in blood and urine, and ultrasonographic examination. The animals diagnosed for renal disorders were subsequently grouped according to age, breed and sex to find the influence of these variables on the occurrence of the condition.

Animals were subjected to extensive clinical examination and were given a clinical score calculated based on clinical signs like anorexia (1 point), lethargy (2 points), vomiting (3 points), diarrhoea (4 points), weight loss (5 points), polyuria (6 points), polydipsia (7 points), pallor (8 points) and/or ulceration of mucous membrane (9 points) and neurologic signs (10 points). The dogs with a score of 6 and above were subjected for ultrasonographic examination and blood and urine biochemical estimations.

Ultrasonographic (USG) examination of sick animals, as well as healthy dogs, was carried out using SONOSITE-600M MACHINE as per the procedure described by

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Nyland *et al*. (2000) using 2.5-5 MHz transducer for both the kidneys. Healthy control dogs were subjected to fasting for 12 hours. However, owners were advised to give *ad libitum* quantity of water. The sick dogs with the clinical signs of the renal disorder as mentioned earlier in the clinical examination were not subjected to fasting. The cranio-ventral abdominal hairs were shaved from costal arch cranially to the inguinal region caudally and laterally along the body wall. Acoustic coupling gel was applied liberally over the abdomen to provide essential acoustic coupling of the transducer to the patient. The animals were gently restrained in dorsal recumbency by holding the forelimbs. No anaesthesia or chemical restraint was used.

Blood samples were collected in clean vials from 10 healthy dogs and all those diagnosed for renal disorders. These were allowed to clot and serum was harvested and stored at -20°C till used for biochemical estimations consisting of serum urea nitrogen (Marsh *et al*., 1965), creatinine (Bonses and Taussky, 1945) and gamma-glutamyl transferees (Jung *et al*., 1986).

The urine samples from healthy and sick dogs have collected aseptically from the urinary bladder by using a urinary catheter for estimation of *N*-acetyl-β-D-glucosaminidase (NAG) as per the method described by Maruhn (1976). Briefly, p-nitrophenyl-*N*-acetyl-β-D-glucosaminide (1.5 mmol/l: 1 ml) was incubated with urine (0.1 ml) which had been diluted with 0.15 mol/l citric acid-disodium phosphate buffer (0.5 ml, pH 4.5 or 4.1) for 30 minutes at 37°C. Enzyme hydrolysis was stopped by the adding 0.5 mmol/l sodium carbonate-bicarbonate, pH 10 (0.5 ml). Colour intensity was measured at 405 nm on a double beam spectrophotometer and enzyme activity was measures using a standard curve prepared over the range 5 to 50 µmol/l.

RESULTS AND DISCUSSION

The total numbers of 880 cases of dogs suffering from different ailments were reported during this period, out of which 63 dogs were suspected and screened for renal disorders based on clinical signs, ultrasonographic findings, serum and urinary biochemical alterations and urine analysis. Out of 63 cases of renal disorders, 44 cases showed the symptoms of anorexia, lethargy, polyuria, polydipsia, weight loss, vomiting and pallor mucous membrane, 11 cases with ulceration of mouth and 8 cases with neurological signs along with other signs of renal disorders were recorded.

Apart from the above signs, 7 animals also presented signs denoting complications *viz*. skin lesions marked by alopecia, ecchymosed and mange infestation. Rectal temperature (101±0.4°F), heart rate (94±18 bpm) and respiratory rates (28±6/minute) were found normal in all the animals. However, abdominal palpation evidenced a sign of pain in 5 cases.

Age-wise distribution

Distribution of renal disorders according to age is given in Table 1 and Fig 1. The overall incidence of renal disorders was 7.15%. No renal disorders were detected in the dogs

Table 1: Age wise Incidence of renal disorders in clinical cases of dogs.

Groups	Total no. of cases	No. of cases with renal disorders	% Incidence
Gr 1 (0-3 years)	94	0	0.00%
Gr 2 (3-6 years)	136	0	0.00%
Gr 3 (6-8 years)	184	6	3.26%
Gr 4 (8-10 years)	172	16	9.30%
Gr 5 (10 years and above)	294	41	13.94%
Over all	880	63	7.15%

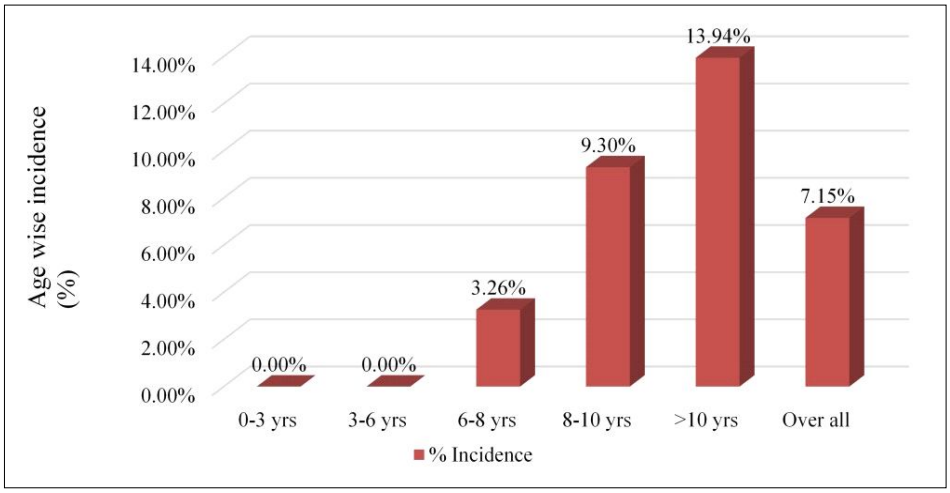

Fig 1: Age wise incidence of renal disorders in clinical cases of dog.

<6 years of age whereas only 6 dogs (3.26%) of 6-8 year age group were confirmed for kidney diseases. The incidence of renal disorders was increased with the advancement of age as 16 (9.30%) and 41 (13.94%) dogs in the age groups of 8-10 year and ≥10 years, respectively The highest incidence of renal disorders was seen in dogs of age group 10 years and above. No renal disorders were detected in the dogs < 6 years of age and only 6 dogs (3.26%) of 6-8 year age group were confirmed for kidney diseases.

The frequency of renal disorders increases with the age in dogs, as inhuman (Cowgill and Sprangler, 1981; Gobar *et al*., 1998; McCall Kaufman, 1984). In another report prevalence of renal diseases in the US, university hospital was observed in 15% of dogs more than 10 years of age (Polzin *et al*., 1989). The age has an important role in the incidence of the renal disorder in canines (Nabi *et al*., 2018). This might be because with the advancing age, blood flow to the kidneys decreases and there is a loss of filtering cells (nephrons). The resorption processes in the nephrons are also impaired with advance age. All these factors contribute to greater chances of renal dysfunction (Polzin, 1990; Grauer and Lane, 1995). In human beings, a slight decrease in GFR and concentrating ability were observed with age. Morphological changes observed in association with ageing in human being include shrinkage of nephron size after 40 years of age (Finco, 1997).

Breed and sex-wise distribution

The breed wise distribution of renal disorders in dogs is shown in Table 2 and Fig 2. The highest incidence was noted in Labrador dogs (12.19%), followed by Bulldogs (11.11%), Dalmatian (10.53%), Great Dane and Rottweiler (9.09%), Doberman (7.86%), German Shepherd (6.73%) and Pomeranian (6.45%). Interestingly lowest incidence was recorded in the mixed or non-descript breed (6.12%).

The sex-wise incidence of renal disorders in dogs is depicted in Table 2 and Fig 3. Out of 63 dogs, 36 male (57%) and 27 female (43%) dogs were confirmed for renal disorders indicating a higher prevalence of renal diseases in males than females.

The breed wise distribution of renal disorders showed the highest incidence of renal disorders in Labrador and lowest in mixed or non-descript dogs while the sex wise occurrences of renal disorders were 57% in male and 43% in female dogs. However, a British survey indicated that 0.2%

Table 2: Breed and Sex wise incidence of renal disorders in clinical cases of dogs.

Breeds	Total no. of cases	No of cases with renal disorders			% Incidence (Male)	% Incidence (Female)	% Incidence (Overall)
		Male	Female	Total			
German Shepherd	163	6	5	11	3.68%	3.06%	6.73%
Great Dane	33	2	1	3	6.06%	3.03%	9.09%
Labrador	41	2	3	5	4.87%	7.32%	12.19%
Dalmatian	38	3	1	4	7.89%	2.63%	10.53%
Doberman	89	4	3	7	4.49%	3.37%	7.86%
Bhutia	13	1	0	1	7.69%	0%	7.69%
Bulldog	09	0	1	1	0%	11.11%	11.11%
Rottweiler	11	1	0	1	9.09%	0%	9.09%
Pomeranian	124	5	3	8	4.03%	2.42%	6.45%
Mixed Breed	359	12	10	22	3.34%	2.78%	6.12%
Over all	880	36	27	63	4.09%	3.07%	7.15%

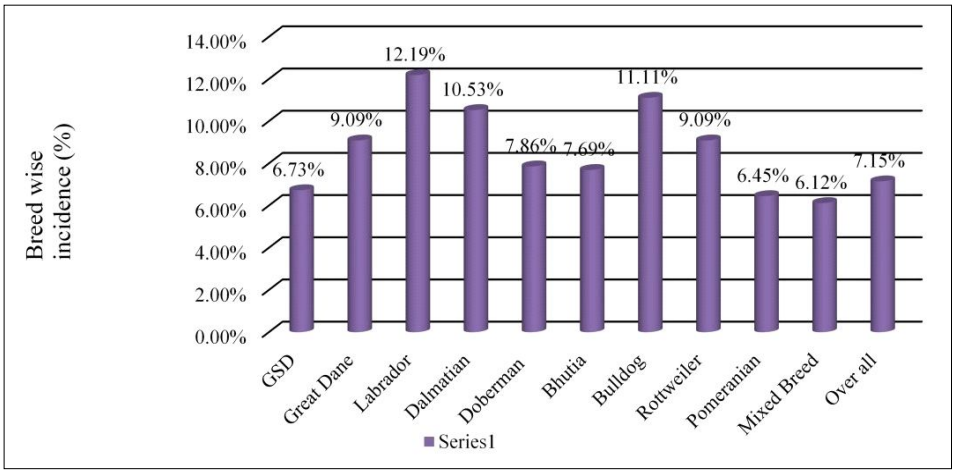

Fig 2: Breed wise incidence of renal disorders in clinical cases of dog.

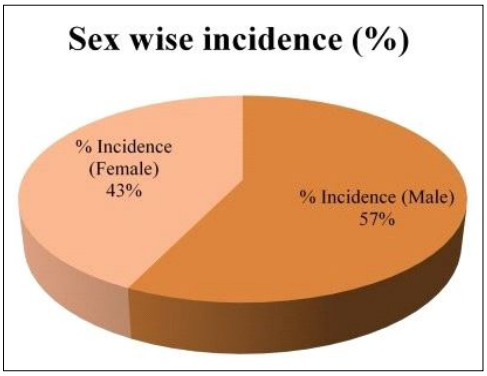

Fig 3: Sex wise incidence of renal disorders in clinical cases of dog.

of dogs were presented with suspected renal disease, which was confirmed in 25% of the cases with no evidence of breed or sex predisposition (Mac Dougall *et al*., 1986) and in another report it was observed that no predisposition of sex has been found in the occurrence of renal disorders in canine (Tilley and Smith, 2007). The female and descript breeds of dogs are having more incidence of renal disorders than male and nondescript breeds (Nabi *et al*., 2018). The lowest incidence of renal disorders in mixed or non-descript dogs might be due to their genetic makeup to sustain the ageing effects on the kidney. However, further investigations involving large population size is warranted to substantiate this finding.

CONCLUSION

It is concluded that the increased occurrence of renal disorder was recorded with the advancement of the age of dogs. Male dogs are suffering from kidney disorder more commonly as compared to female dogs. The highest incidence of renal disorder was observed in Labrador dogs followed by Bulldogs, Dalmatian, Great Dane and Rottweiler, Doberman, German Shepherd, and Pomeranian, while the lowest incidence was recorded in the mixed or non-descript breed as compared to the specific breed of dogs.

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