Clinical findings in cats and dogs with chronic kidney disease

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Introduction

Chronic kidney disease (CKD), formerly referred to as chronic renal failure, is common in elderly pets; 7.9% of cats and 1.5% of dogs > 10 years of age seen at Banfield Pet Hospitals in 2012 were diagnosed with the disease, and the progressive and irreversible nature of kidney damage threatens the longevity and quality of life for affected pets. It is therefore important to understand the demographic and clinicopathologic characteristics typical of pets first diagnosed with CKD in general veterinary practice.

Method of analysis

Canine and feline patients at 815 Banfield Pet Hospitals were considered eligible for the study when they had a first-ever diagnosis of CKD at some point in 2011 or 2012. Included patients were required to have had at least one other recorded consultation prior to the visit when CKD was diagnosed. Variables recorded at time of CKD diagnosis included age and bodyweight, sex, reproductive status, and breed size (dogs only). Other variables extracted closest to (before or after) the CKD diagnosis were as follows: serum creatinine, phosphate, calcium, and potassium concentrations; urine specific gravity; diagnosis of overweight, obesity, or underweight; and type of diet fed (wet, dry or mixed). It was also noted if there was a prior or existing diagnosis of periodontal disease, cystitis, hyperthyroidism, hypertension, or diabetes mellitus.

Summary statistics were calculated as percentages and mean ± SD when normally distributed or as median (range) when not normally distributed. The Chi square test was used to compare the proportions of pets with CKD with those in the general population with respect to reproductive status, breed size and diet types and with those in the general geriatric pet population (*i.e.*, ≥ 10 years of age) regarding prevalence of various diseases. Values of $P < 0.01$ were considered significant.

Results

A total of 11,752 cats and 7,293 dogs met the study inclusion criteria. The mean ± SD age of cats with CKD was 13.5 ± 4.2 years, with 81.0% (9,516/11,752) ≥ 10 years of age. The mean age of dogs was 10.9 ± 4.1 years, with 65.3% (4,762/7,293) ≥ 10 years of age.

Comparisons with the general patient population showed spayed female (6,022/11,752; 51.3%) and neutered male (5,266/11,752; 44.8%) cats to be over-represented ($P < 0.001$) among cats with CKD (general population values, 36.6% and 36.5%, respectively). The same was true for spayed female dogs (3,630/7,293; 49.8% *vs* 36.5% in general population) but not for neutered males (2,590/7,293; 35.5% *vs* 36.6% in general population). Intact males and females were under-represented in both species with CKD. No significant differences were evident in the distribution of breed sizes in dogs with CKD, as compared with the distribution in the general population, nor was any difference evident between cats and dogs with CKD and the general population in type of food consumed.

The prevalence of cats and dogs with CKD that were also underweight and had periodontal disease was much higher than in the general population > 10 years of age ***(Table 1)***. Cats and dogs with CKD were also more likely to have cystitis, hyperthyroidism, diabetes mellitus and/or hypertension.

According to the IRIS staging system (1) (for more information, see inside front and back covers), which recommends use of plasma creatinine values to stage disease progression, the distribution of cats newly diagnosed

ROYAL CANIN

Table 1. Distribution of comorbidities in cats and dogs with CKD.

Diagnosis	No. (%) of all cats with CKD (n = 11,752)	% in general geriatric cat patient population (n = 162,102)	No. (%) of all dogs with CKD (n = 7,293)	% in general geriatric dog patient population (n = 420,203)
Overweight	813 (6.9)[a]	23.5	705 (9.7)[a]	26.0
Underweight	1,212 (10.3)[b]	5.5	396 (5.4)[b]	1.8
Periodontal disease	3,312 (28.2)[b]	19.6	3,006 (41.2)[b]	27.4
Cystitis	1,838 (15.6)[b]	6.8	1,081 (14.8)[b]	3.7
Hyperthyroidism	1,081 (9.2)[b]	6.3	13 (0.2)[b]	0.1
Diabetes mellitus	406 (3.5)[b]	3.2	120 (1.7)[b]	1.1
Hypertension	122 (1.0)[b]	0.3	81 (1.1)[b]	0.2

[a] Value is significantly ($P < 0.01$) lower than in the general population. [b] Value is significantly higher than in the general population.

Table 2. Values of clinicopathologic variables in cats and dogs with CKD.

Variable	No. of cats with results	Value	Reference interval (2)	No. of dogs with results	Value	Reference interval (2)
Serum creatinine (mg/dL)	9,285	3.2 (0.4-33.6)	0.9-2.2	6,372	2.6 (0.4-36.0)	0.5-1.7
Urine specific gravity	6,046	1.019 ± 0.038	1.020-1.040	3,804	1.018 ± 0.010	1.016-1.060
Serum potassium (mEq/L)	6,106	4.3 ± 1.0	3.7-6.1	3,939	5.0 ± 1.8	3.9-5.1
Total calcium (mg/dL)	9,302	10.3 ± 1.0	8.7-11.7	6,432	10.8 ± 1.3	9.1-11.7
Serum phosphate (mg/dL)	9,316	5.3 (0.1-32.2)	3.0-6.1	6,435	5.9 (0.2-30.4)	2.9-5.3

Normally distributed data are reported as mean ± SD, and non-normally distributed data are summarized as median (range).

with CKD in each stage of disease for which creatinine values were available (n = 9,285) was as follows: nonazotemic (< 1.6 mg/dL), 366 (3.9%); mild renal azotemia (1.6-2.8 mg/dL), 3,121 (33.6%); moderate renal azotemia (2.9-5.0 mg/dL), 3,403 (36.7%); and severe renal azotemia (> 5.0 mg/dL), 2,395 (25.8%). The distribution of dogs with available creatinine values (n = 6,372) was as follows: nonazotemic (< 1.4 mg/dL), 506 (7.9%); mild azotemia (1.4 to 2.0 mg/dL), 1,492 (23.4%); moderate azotemia (2.1-5.0 mg/dL), 3,221 (50.5%); and severe azotemia (> 5.0 mg/dL), 1,153 (18.1%). Values of these and other clinicopathologic values for cats and dogs were summarized ***(Table 2)***.

Discussion

This basic analysis revealed some interesting findings that may aid clinicians in formulating their index of suspicion of CKD in cats and dogs, particularly in those ≥ 10 years old that are underweight and have other diseases. Clinical signs associated with kidney disease (*e.g.*, lethargy, dehydration, vomiting, or polyuria/polydipsia), though nonspecific, are also useful to raise the suspicion of CKD. The range of values for serum creatinine concentration and the high prevalence of cats with apparently normal values at the early stages of CKD reinforce the potential for mistakes to be made if reference limits are used to rule out the disease. Additional research is needed to better understand the natural history of CKD and the percentage change in analytes that can be expected for pets in the early stages when appropriate interventions may slow disease progression and make patients more comfortable.

References

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