The effect of increasing levels of potassium chloride on urine specific gravity, urine volume, and relative supersaturation in dogs and cats

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OBJECTIVES

This study investigated the effect of KCl on urine dilution and calcium oxalate (CaOx) relative supersaturation (RSS).

METHODS

One base formula was supplemented with KCl to reach [K+] of 1.56, 3.35 and 4.62 g/Mcal (diets A, B and C respectively). Nine cats and 5 dogs were fed each diet for 10 days. Water intake and urine volume were recorded. Urinary ions were measured on pooled sample using

ionic chromatography. CaOx RSS was calculated using SUPERSAT software. Mixed effect models assessed the effect of diet on water intake, urine volume, urine specific gravity (USG), and CaOx RSS.

RESULTS

For cats, water intake was significantly higher on Diet C versus Diet A (Diet A: 22.4 ± 5.3 ml/kg/day; Diet B: 25.9 ± 6.0 ml/kg/day; Diet C: 28.5 ± 7.2 ml/kg/day, $P < 0.01$). Urine volume increased (Diet A: 8.5 ± 2.5 ml/kg/day; Diet B: 13.1 ± 1.7 ml/kg/day; Diet C: 15.4 ± 2.1 ml/kg/day, $P < 0.0001$), USG decreased with increasing KCl (Diet A: 1.070 ± 0.008 ; Diet B: 1.065 ± 0.007 ; Diet C: 1.060 ± 0.005 , $P < 0.0001$). CaOx RSS was lower on Diets B and C versus Diet A (Diet A: 2.55 ± 0.76 ; Diet B: 1.95 ± 0.60 ; Diet C: 1.65 ± 0.52 , $P < 0.01$).

For dogs, increasing KCl increased water intake (Diet A: 33.7 ± 3.0 ml/kg/day; Diet B: 38.7 ± 1.9 ml/kg/day; Diet C: 46.1 ± 1.9 ml/kg/day, $P < 0.0001$). Urine volume increased (Diet A: 20.2 ± 2.84 ml/kg/day; Diet B: 24.0 ± 2.77 ml/kg/day; Diet C: 33.8 ± 2.5 ml/kg/day, $P < 0.0001$), USG decreased (Diet A: 1.055 ± 0.008 ; Diet B: 1.048 ± 0.006 ; Diet C: 1.041 ± 0.004 , $P < 0.001$). CaOx RSS decreased (Diet A: 8.76 ± 0.140 ; Diet B: 7.05 ± 1.89 ; Diet C: 5.66 ± 0.95 , $P < 0.001$).

STATEMENT (CONCLUSIONS)

Increasing KCl leads to increased urine volume and decreased USG and CaOx RSS in healthy dogs and cats. KCl can be used as a nutritional strategy to decrease crystallisation risk.

Agreement between voided urine samples and cystocentesis samples for urine protein-to-creatinine ratio (UPC) determination in cats

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OBJECTIVES

To compare UPCs of urine obtained by cystocentesis with voided samples.

METHODS

Paired cystocentesis and voided urine samples were obtained within 23-hours from 43 cats presented to a referral hospital. Voided samples were collected from litter trays containing non-absorbent sand litter. Urine sediments were classified as active or inactive and UPCs were determined. Statistical analyses were performed using commercially available software for all samples and then separately according to sediment status. The difference between UPCs obtained from each method of collection was assessed using the Wilcoxon signed-rank test. Agreement between measurements was assessed using Passing-Bablok regression and Bland-Altman analysis. Agreement for proteinuria classification according to the International Renal Interest Society (IRIS) was assessed using Cohen's kappa.

RESULTS

UPCs ranged from 0.06 to 0.99. Twenty and twenty-three sediments were active and inactive respectively. Regardless of sediment status, statistically significant lower UPCs were observed in voided samples compared to cystocentesis samples. Passing-Bablok regression analysis revealed minimal constant and proportional

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error with an equation of $y = -0.0019 + 0.8596x$ for all samples. Visual assessment of Bland-Altman plots demonstrated superior agreement between voided and cystocentesis samples for inactive sediments of UPC <0.5 compared to active sediments. Cohen's kappa coefficient for all samples was $\kappa = 0.666$, corresponding to substantial agreement, this was reduced for samples with active sediments to $\kappa = 0.489$, corresponding to moderate agreement. Cohen's kappa for samples with inactive

sediments was $\kappa = 0.833$, corresponding to almost perfect agreement.

STATEMENT (CONCLUSIONS)

These data suggest voided urine samples are acceptable for UPC determination of samples with inactive sediments and UPC <0.5 only.

Retrospective evaluation of UK dogs with detrusor-urethral dyssynergy (37 cases)

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OBJECTIVES

To evaluate signalment, presenting complaint, diagnosis, treatment and outcome of dogs diagnosed with detrusor urethral dyssynergy within UK referral centres.

METHODS

Multi-centre ($n = 3$), retrospective, observational study. Database searches were performed (2007–2019) to identify dogs with a presumptive diagnosis of detrusor urethral dyssynergy. Dogs were excluded if mechanical urinary obstruction or clinically-detectable neurological

abnormalities were present. Signalment, presenting complaint, physical examination findings, clinico-pathological abnormalities, diagnostic imaging, therapeutic protocol and outcome were recorded.

RESULTS

Thirty-seven dogs were included. Middle-aged, large breed, male entire dogs were over-represented. Labradors were the most common breed (8/37). Four female dogs were included (2 entire, 2 neutered). Median duration of clinical signs was 137 days (range 0–1095). Stranguria (19/37) and dysuria (13/37) were the most common presenting complaints. Response to initial medical therapy was good, partial or absent in 20, 7 and 10 dogs, respectively. Two of ten dogs with absent response subsequently had a cystostomy tube placed with reported complete resolution of clinical signs. Six dogs died during the follow-up period (median 121 days, range 4–1460), with three deaths attributable to detrusor urethral dyssynergy. Medical therapy could be discontinued in 11/20 dogs that demonstrated a good response to therapy. Three of these dogs encountered relapse of clinical signs.

STATEMENT (CONCLUSIONS)

This is the first description of a UK dog population with detrusor urethral dyssynergy. This is an uncommon disorder of male dogs and rare in females. Labradors appear over-represented. Medical management can result in a favourable prognosis in the majority of dogs, although many will require life-long medication.

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