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Prevalence of vitamin D analogue toxicity in dogs

Dear Editor,

Calcipotriol, calcitriol and tacalcitol are topical vitamin D analogues commonly used to treat psoriasis[1]. As clinicians, although the treatments are often well tolerated, we often consent the known adverse effects[1,2] such as irritation, erythema, and rarely photosensitivity. Vitamin D analogue toxicity in dogs is rarely reported with only 2 cases reported in veterinary literature[3,4], and more recently, 2 reports in dermatology literature[4,5]. This is the first published study in reporting the exact number of cases and the clinical effects of vitamin D analogue toxicity in dogs.

410 cases of vitamin D analogue cream ingestions by dogs were reported by the Veterinary Poisons Information Service (VPIS) between 1992 to 2019. Of these 359 cases (87.6%) were due to calcipotriol ingestion, 32 cases (7.8%) involved calcitriol and 19 cases (4.6%) were due to tacalcitol ingestion.

Of the 359 canine cases involving calcipotriol cream ingestion, 152 cases had a documented, known outcome. Within these 152 cases, 129 dogs developed signs, 19 dogs died and 17 were euthanised. Of the dogs that developed signs (n=129), there was a fatal outcome in 36 dogs (27.9%).

Of the 32 cases involving calcitriol cream ingestion, 9 cases had outcome information documented. All 9 dogs developed signs; 2 dogs were euthanised, 2 died and 5 recovered. Of the dogs that developed signs (n=9), there was a fatal outcome in 4 dogs (44.4%).

Of the 19 cases involving tacalcitol (Curatoderm) lotion ingestion, 12 cases had clinical outcomes documented, with all 12 dogs developing signs, 6 (50%) dogs died and 1 dog was euthanised.

In order of frequency (Table 1), the reported clinical findings (n=173) from vitamin D analogue ingestion include vomiting (93, 53.8%), hypercalcaemia (84, 48.6%), diarrhoea (35, 20.2%), hyperphosphataemia (32, 18.5%), renal failure (26, 15%), polydipsia (24, 13.9%), and polyuria (18, 10.4%).

In summary, from the documented outcomes, 59.5% (103 dogs) recover from their symptoms and the overall mortality rate (including euthanised cases) from vitamin D analogue ingestion was 27.2% (47 cases). The toxicity studies[7] in dogs suggest that 1.8 to 3.6 µg/kg/day of calcipotriol may cause disturbances in calcium homeostasis.

The toxic acute dose of calcipotriol is approximately 10 mcg/kg [8] and as little as 67 mcg/kg can be fatal[8]. A calcipotriol psoriasis cream is typically 50 mcg/g and a toxic dose of 10 mcg/kg would be equivalent to only 0.2 g of cream/kg.

We believe this is the first study to report the numbers and outcomes of vitamin D analogue toxicity in dogs. The current patient information leaflets on topical vitamin D analogue treatments, including the one found on British Association of Dermatologists and by the manufacturers, do not inform our patients of this risk for their canine companions.

We, as dermatologists and frequent prescribers of topical vitamin D analogues should be aware of this potentially fatal consequence for dogs and it is also our responsibility, and not just the veterinary's, to warn our human patients of the risks to their loved canine companions and advise them how to use and store these medicines safely.

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Table 1: Frequency of reported adverse clinical effects in dogs after ingestion of vitamin D analogues in cases with known outcome reported to the Veterinary Poisons Information Service (VPIS)

Agent ingested	**Calcipotriol**	**Calcitriol**	**Tacalcitol**	**Total (%)**
Total number of dogs	**152**	**9**	**12**	**173 (100%)**
Clinical signs reported				
Vomiting	78	7	8	93 (53.8%)

Hypercalcaemia	75	4	5	84 (48.6%)
Diarrhoea	31	3	1	35 (20.2%)
Hyperphosphataemia	28	-	4	32 (18.5%)
Renal failure	21	3	2	26 (15.0%)
Polydipsia	22	-	2	24 (13.9%)
Polyuria	17	-	1	18 (10.4%)
Collapse	10	3	3	16 (9.2%)
Inappetence/anorexia	14	-	-	14 (8.0%)
Azotaemia	8	-	2	10 (5.8%)
Abdominal discomfort	8	-	-	8 (4.6%)
Haematemesis	5	1	2	8 (4.6%)
Tachycardia	4	4	-	8 (4.6%)
Hypokalaemia	4	-	-	4 (2.3%)
Convulsions	2	1	-	3 (1.7%)
Respiratory distress	2	-	1	3 (1.7%)
Arrhythmias	2	1	-	3 (1.7%)
Ataxia	2	-	-	2 (1.2%)
GI haemorrhage	1	-	1	2 (1.2%)
Bradypnoea	-	1		1 (0.6%)
Cardiorespiratory arrest	-	-	1	1 (0.6%)