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Repeated exposure to trichlorfon caused death in a young cat

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ABSTRACT: Trichlorfon poisoning is critical in veterinary toxicology, particularly in small animals, such as cats, which are highly sensitive to organophosphate insecticides. The owner brought a four-month-old Persian cat to the Zoom Veterinary Clinic after experiencing seizures following exposure to insecticide-containing trichlorfon. On physical examination, the cat exhibited seizures, hypersalivation, and cyanosis of the gums and ears. Hematology and blood biochemistry tests were then performed to assess the systemic body condition. Hematology results revealed an increase in the white blood cell count, while blood biochemistry analysis showed elevated blood glucose, SGPT, calcium, and amylase levels, along with decreased creatinine levels. Initial treatment included administration of atropine sulfate, Ornipural®, and intravenous lactated Ringer's solution. Although the cat initially showed signs of improvement, seizures recurred. The cat was hospitalized at the Zoom Veterinary Clinic and received further treatment, including diazepam, cefotaxime, intravenous lactated Ringer's solution, furosemide, Ornipural®, and Novifit®. On the second day of hospitalization, the cat succumbed to its condition.

Keywords:
poisoning, triklorfon, seizures, young cat

■ INTRODUCTION

Poisoning is an interaction between a toxic agent and a biological system that causes harm to living organisms (Dear, 2014). According to the American Society for the Prevention of Cruelty to Animals (ASPCA), common cat poisoning toxins include human medications, human foods, plants, and household toxins such as disinfectants, veterinary health products, insecticides, and psychoactive drugs. A study conducted by Markert *et al*. (2016) in Germany reported that poisoning caused by antiparasitics and insecticides accounted for approximately 6% of cases, while unknown toxic agents were responsible for 48.2% of cases.

Organophosphates are chemical compounds formed through the esterification of phosphoric acid and alcohol (Adeyinka *et al*. 2023). Cases of organophosphate poisoning in cats and dogs account for 86.9% of toxicological incidents (Bernal-González *et al*. 2023). One organophosphate insecticide is trichlorfon, a broad-spectrum insecticide that controls internal and external parasites. Trichlorfon was moderately toxic, with an oral LD50 of 450–600 mg/kg in rats and a dermal LD50 ranging from 1,500 to over 2,100 mg/kg in rabbits. Clinical signs of toxicity may appear between one and four weeks after exposure (Karanth 2014). However, reports of trichlorfon poisoning in cats in Indonesia remain scarce.

Therefore, this report aims to describe a case of trichlorfon insecticide poisoning in a cat treated at Zoom Veterinary Clinic.

■ CASE

Anamnesis and Signalments: The patient was a 4-month-old female Persian cat weighing 1.8 kg. The cat's owner reported that the cat experienced seizures and a loss of appetite one week after the owner sprayed its body with an insecticide containing trichlorfon to treat scabies. The product label indicated that it was safe even if licked by animals, leading the owner to take no special precautions during use. **Physical Examination**: The cat exhibited hypersalivation, cyanosis, and seizures, with a rectal temperature of 37.3°C. **Diagnostic Tests**: Hematological and blood biochemical analyses were performed to support the diagnosis.

■ RESULTS AND DISCUSSION

Table 1 presents the hematological and blood biochemical analysis results of the cats. An increase in white blood cell (WBC) count was observed in the hematology test. This evidence is a response to inflammation and is part of the body's defense mechanism. Elevated WBC counts can also be observed in cases of poisoning (Rahmawati *et al*. 2023).

Increased glucose levels can lead to seizures. Seizures can acutely disrupt blood glucose levels by releasing stress hormones, insulin resistance, and dysregulation of the autonomic nervous system (Nadeem *et al*. 2023). Elevated serum

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glutamic pyruvic transaminase (SGPT) level is commonly associated with liver damage. Meanwhile, a slight increase in calcium levels (only 0.1 above the upper limit) is considered clinically insignificant. Increased amylase levels can be linked to conditions such as pancreatitis, pancreatic cancer, or pancreatic obstruction. However, a definitive pancreatic diagnosis should be supported by lipase evaluation.

Seizures in cats can have intracranial or extracranial causes. Intracranial causes include brain tumors, brain infections, trauma, inflammation, and brain parasites such as Toxoplasma. Extracranial factors may include kidney or liver disease, toxin exposure, ingestion of human medications, heatstroke, infectious diseases, and hypertension. In cats younger than four years, seizures are typically caused by congenital conditions, inflammation, infection, toxins, or metabolic disorders (Kline 2009).

Trichlorfon undergoes biotransformation in the liver, forming dichlorvos, which is a potent acetylcholinesterase inhibitor that affects both parasites and mammals. Inhibition of acetylcholinesterase leads to the accumulation of acetylcholine at synapses, causing excessive stimulation of the nervous system—a condition known as cholinergic toxidrome (Adeyinka *et al*. 2023).

Table 1. Hematological and blood biochemistry test results of a young Persian cat with trichlorfon poisoning

Parameters	Results	Normal value
Hematology		
Red Blood Cell (M/uL)	7.57	6.54-12.3
Hematocrit (%)	34.2	30.3-52.3
Hemoglobin (g/dL)	10.7	9.8-16.2
MCV (fL)	45.3	35.9-53.1
MCH (pg)	14.1	11.8-17.3
MCHC (g/dL)	31.2	28.1-35.8
White Blood Cells (K/uL)	**16.7**	**5.5-14.4**
Neutrophil (K/uL)	11	2.1-15
Lymphocyte (K/uL)	5.0	0.92-6.88
Monocyte (K/uL)	0.5	0.05-0.67
Eosinophil (K/uL)	0.4	0.17-1.57
Basophil (K/uL)	-	0.01-0.26
Platelet (K/uL)	245	200-377
Biochemistry		
BUN (mg/dL)	21.5	14-36
Creatinine (mg/dL)	**0.33**	**0.6-2.4**
Glucose (mg/dL)	**154**	**74-114**
SGPT (U/L)	**180**	**10-100**
Ca^{2+} (mg/dL)	**10.9**	**8.2-10.8**
Phosphor (p)	8.17	2.4-8.2
Alkali Phosphatase (U/L)	99	6-102
Cholesterol (mg/dL)	162	75-220
Total Protein (g/dL)	7.7	5.2-8.8
Albumin (g/dL)	3.4	2.5-3.9
Total Bilirubin (mg/dL)	0.19	0.1-0.4
Creatine Kinase (u/L)	144	56-529
Amylase (A) (u/L)	**2,651**	**100-1,200**
Globulin (G) (g/dL)	4.3	2.3-5.3
A:G ratio	0.79	0.45-1.2

Note: MCV= Mean Corpuscular Volume; MCH= Mean Corpuscular Hemoglobin; MCHC= Mean Corpuscular Hemoglobin Concentration; BUN= Blood Urea Nitrogen; SGPT= Serum Glutamic-Pyruvic Transaminase; blue=decreased; red=increase; black=normal.

Excessive acetylcholine activity in the central nervous system (CNS) can lead to depression, coma, and seizures. Organophosphates are rapidly distributed in the adipose tissue, kidneys, and liver (Robb *et al*. 2023). Their metabolites can suppress humoral and cellular immune regulation including phagocytosis, cytokine expression, antibody production, and immune cell proliferation and differentiation (Bernal-González *et al*. 2023).

■ CONCLUSION

Trichlorfon poisoning in cats can result from exposure to sprayed insecticides. Trichlorfon metabolites lead to acetylcholine accumulation, which triggers seizures. Treatment should focus on seizure management, liver support for detoxification, and elimination of toxins. Immediate intervention is crucial to prevent poisoning from becoming fatal.

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