



Natural intoxication by *Euphorbia milii* ("crown of Christ") in a dog in Rio de Janeiro: a case report

Intoxicação natural por *Euphorbia milii* ("coroa de Cristo") em um cão no Rio de Janeiro: relato de caso

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ABSTRACT: Ornamental plants are not part of a dog's diet, and even those not usually consumed, such as *Euphorbia milii*, can be accidentally ingested, which can be dangerous when inducing mild to severe poisoning and even death. Pets ingest these plants because of stress, discomfort, and pain. This study aimed to describe the clinical, epidemiological, and pathological aspects of intoxication by *E. milii*, an ornamental plant known as the "crown of Christ" in a domestic dog and warn owners about possible accidents with ornamental plants. A 9-year-old Yorkshire bitch was taken to a veterinary clinic after ingesting large quantities of the plant. The animal presented with hematemesis, hematochezia, hyperthermia, mydriasis, motor incoordination, mental confusion, and agitation and died during treatment for poisoning. At necropsy, cyanosis, congestion of the mucous membranes, petechiae, and suffusions were observed in various organs, particularly in areas perforated by the plant's thorns. The stomach was very dilated and full of still-green leaves, as well as thorns. Histopathology showed a congestive and hemorrhagic state in various organs, erythrocyte aggregation, vacuolization, and necrosis of renal tubular cells.

Keywords: toxic plant; dog; pathology; ornamental plant.

RESUMO: As plantas ornamentais não fazem parte da dieta dos cães, e mesmo aquelas que normalmente não são consumidas, como a *Euphorbia milii*, podem ser ingeridas acidentalmente, o que pode ser perigoso, pois induz envenenamento leve a grave e até mesmo a morte. Os animais de estimação ingerem essas plantas devido ao estresse, desconforto e dor. Este estudo teve como objetivo descrever os aspectos clínicos, epidemiológicos e patológicos da intoxicação em um cão doméstico, por *E. milii* uma planta ornamental conhecida como "coroa de Cristo", e alertar os proprietários sobre possíveis acidentes com plantas ornamentais. Uma cadela Yorkshire de 9 anos foi levada a uma clínica veterinária após ingerir grandes quantidades da planta. O animal apresentava hematêmese, hematoquezia, hipertermia, midríase, incoordenação motora, confusão mental e agitação, e morreu durante o tratamento para intoxicação. À necropsia, foram observadas cianose, congestão das membranas mucosas, petéquias e sufusões em vários órgãos, particularmente em áreas perfuradas pelos espinhos da planta. O estômago estava muito dilatado e cheio de folhas ainda verdes, bem como espinhos da planta. A histopatologia mostrou um estado congestivo e hemorrágico em vários órgãos, agregação de eritrócitos, vacuolização e necrose das células tubulares renais.

Palavras-chave: planta tóxica; cão; patologia; planta ornamental.

INTRODUCTION

Under natural conditions, pets generally do not ingest plants, unless some conditions such as pain or stress push them out of their comfort zone. The reported cases are usually associated with the ingestion of ornamental plants available in their habitat. Contrary to popular belief, it is a myth that animals instinct protects them from plant poisoning (Tokarnia *et al.*, 2012). The cases reported are generally associated with the ingestion of ornamental plants available in their habitat, and more than half of them are indoors (Bertero *et al.*, 2021).

This study reports, for the first time, the clinical and pathological picture of the natural intoxication of a Yorkshire bitch by *Euphorbia milii* ("crown of Christ, crown of thorns, and martyrdoms"). It is a

semiherbaceous shrub of the Euphorbiaceae family, native to Madagascar, 50–80 cm long, lactescent, rich in aggressive thorns, with elliptical leaves at the top of the branches and flowers arranged two by two (red, yellow, white, or pink), and generally used in hedges (Lorenzi; Silva, 1999). The toxic substances of this species are concentrated in the latex and have been identified as phorbol esters, a substance found in other Euphorbiaceae species (Zani *et al.*, 1993; Oliveira *et al.*, 2007; Fonseca *et al.*, 2010).

This report has two interesting aspects: the plant is in a pot in the owner's home, and it is a lactescent plant with numerous thorns on its stem. Thus, this study aimed to warn pet owners about possible accidents involving ornamental plants in dogs at home and describe the epidemiological, clinical, and pathological aspects of this intoxication.

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MATERIAL AND METHODS

A 9-year-old neutered Yorkshire bitch, with a body score of 4 (on a scale of 1–5), from Juiz de Fora, MG, ingested a large quantity of *E. milii* leaves and stem pieces inside her owners' home (Figure 1). Clinical examinations revealed hematemesis, hematochezia, hyperthermia, difficulty breathing, mydriasis, hemorrhagic gastroenteritis, motor incoordination, mental confusion, and agitation. She was treated with intravenous fluid therapy, mucolytics, bronchodilators (atropine), furosemide, liver protective agents, and activated charcoal (rectally). The dog was then sedated with propofol and diazepam, intubated, and probed with a nasogastric and tracheal tube. The condition worsened, and the animal died after 12 h. The necropsy was performed at the Pathology Department of the Federal Rural University of Rio de Janeiro (UFRRJ). Samples of various organs were collected, fixed in 10% buffered formalin, processed using routine methods for histopathological examination, and stained with hematoxylin and eosin.

Figure 1 – *Euphorbia milii* (“crown of Christ”) poisoning in Yorkshire. Plant showing signs of having been ingested by the dog in the owner's house.



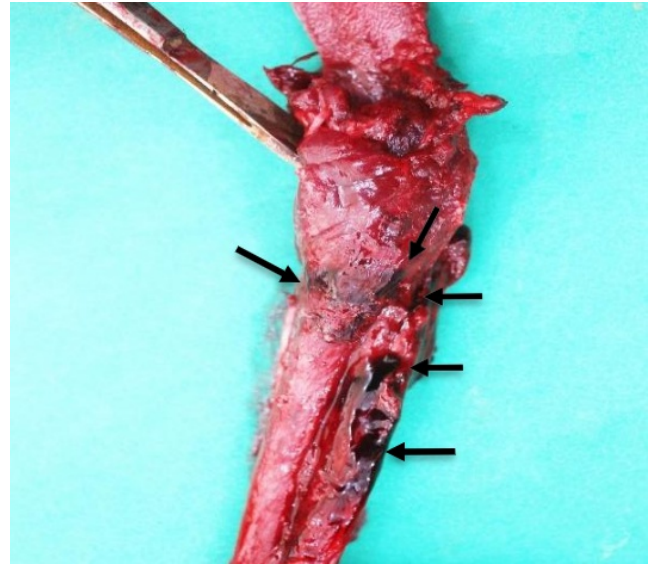
Source: the author.

The ingested plant parts collected from the gastrointestinal tract and samples left on the pot were sent to the Herbarium of the Biology Institute of the UFRRJ for recognition.

The main macroscopic alterations consisted of marked mucosal congestion, severely dilated and congested episcleral and subcutaneous vessels, cyanosis of the abdominal skin, esophageal and peritracheal perforations, and hemorrhages with ecchymoses and clots (Figure 2), particularly in the initial and middle thirds of the esophagus. The tracheal mucosa and lungs were diffusely congested, with multifocal, locally extensive, randomly distributed hemorrhages. In the epicardium, numerous petechiae and ecchymoses were found. In the liver, mild diffuse congestion and evidence of lobulation were observed. Petechiae and ecchymoses were noted in the adrenal glands. The stomach was severely dilated and full of leaves, thorns, and some foreign bodies (cigarette butts, rubber fragments, and

hairs) (Figure 3). The kidneys and gastric and intestinal mucosa (Figure 4) were diffusely and intensely congested, with petechiae, suffusions, and dark-red liquid content. Perforations were observed in the duodenum, and the pancreatic lymph node was hemorrhagic. The meningeal vessels and cranial and caudal vena cavae were intensely dilated.

Figure 2 – *Euphorbia milii* (“crown of Christ”) poisoning in Yorkshire. Ecchymoses and clots at sites perforated by the plant's thorns were observed in the larynx, trachea, and esophagus (arrows).



Source: the author.

Figure 3 – *Euphorbia milii* (“crown of Christ”) poisoning in Yorkshire. The stomach was congested and full of the plant's leaves. In detail, leaves and some foreign bodies (cigarette butts, rubber fragments, and hairs) were found.



Source: the author.

Histopathology of the lungs showed marked vascular congestion in the alveolar capillaries and vessels of the interlobular septa, alveolar edema, and foci of interstitial and alveolar hemorrhage (Figure 5). Other observations included severe centrilobular and periportal hepatic congestion, with slight hemosiderosis, intense splenic congestion with compression of the lymphoid follicles, and moderate hemosiderosis. Renal congestion, particularly in the

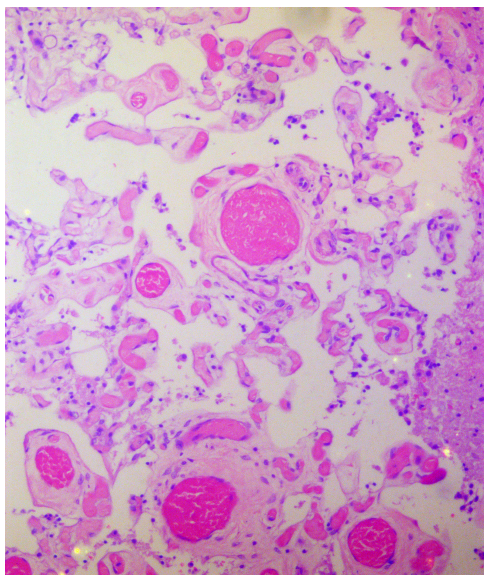
glomerular capillaries and corticomedullary region, accompanied by the degeneration and necrosis of the collecting tubule cells, was observed (Figure 6). Marked diffuse congestion and multifocal hemorrhages of the gastric and intestinal serosa, muscles, and submucosa, accompanied by erosions and ulcerations, were noted. Severe congestion of brain vessels with procoagulatory activity and erythrocyte aggregation was found.

Figure 4 – *Euphorbia milii* ("crown of Christ") poisoning in Yorkshire. The intestines were congested diffusely.



Source: the author.

Figure 5 – *Euphorbia milii* ("crown of Christ") poisoning in Yorkshire. Severe pulmonary congestion. Hematoxylin and eosin staining, obj. 20.

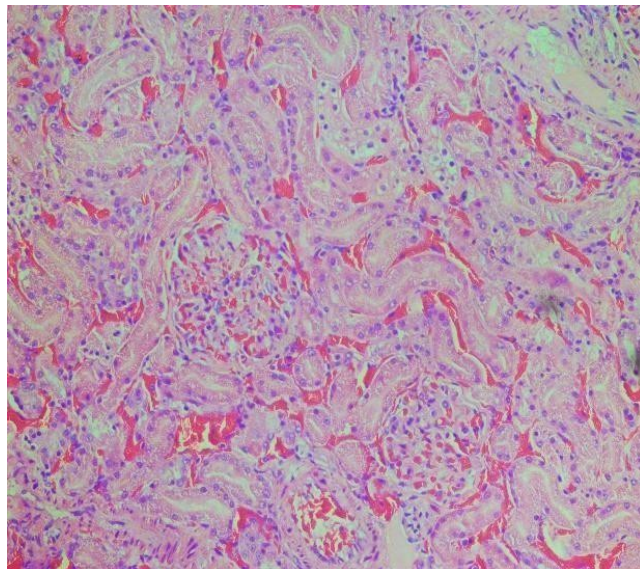


Source: the author.

DISCUSSIONS

To what extent poisoning by ornamental plants in pets is underdiagnosed is unknown because few scientific publications of cases compared poisoning in farm animals. Accordingly, many factors linked to plants and animals must be considered. The growth stage of the plant, amount of the plant ingested in relation to the weight of the animal, toxicity, palatability, nature of the toxic substance, toxic part of the plant, time elapsed

Figure 6 – *Euphorbia milii* ("crown of Christ") poisoning in Yorkshire. Severe renal congestion. Hematoxylin and eosin staining, obj. 20.



Source: the author.

from ingestion to the onset of clinical signs, direct or indirect action on the system(s) or organ(s) involved, and nature of the lesions are all important information and form part of a wide range of clinical pictures; however, they are not always studied comprehensively (Tokarnia *et al.*, 2012). Moreover, the species, breed, age, size, degree of tolerance or individual resistance of the pet, whether the animal was intoxicated in its usual environment or transferred to a different location, and whether it was very hungry, anxious, stressed, or bored all make a difference. These factors must be considered when taking an anamnesis to elucidate or at least help determine the cause of the intoxication. As regards plant intoxication in dogs, few studies refer to these aspects, and the scarcity of information makes diagnosis difficult.

Diagnoses are often based on the clinical presentation and scant history provided by the owners about possible plant ingestion. The failure to diagnose poisoning by toxic plants in pets can be hampered by the affectionate relationship of their owners who do not authorize anatomopathological examinations that would confirm the diagnosis. According to Bertero *et al.* (2021), other factors that lead to underreporting include the unspecificity of the clinical signs, difficulty for the owners to witness the plant ingestion, and general lack of knowledge about toxic plants. In addition, owners may call emergency centers about clinical signs of poisoning, when often these signs are due to other medical conditions. Moreover, veterinarians rule out other underlying causes based on clinical signs described by owners, particularly when plant poisoning is suspected and the plants involved were mistakenly not considered toxic.

In this case, we cannot accurately attribute all the clinical signs to the active ingredient in *E. milii*, which are not entirely clear according to Gfeller and Messonnier (2006). The systemic congestive condition, with congested mucous membranes, cyanosis, edema and hemorrhages in the lungs, and hemorrhages in the adrenals, found in the examined dog is very likely linked to circulatory shock (Filho, 2021). Acute gastric dilatation with marked impaction by the plant was also an aggravating factor. In addition to the shock, we

cannot rule out the possibility that the irritant action of the plant's latex on the mucous membranes played a synergistic role in making the mucous membranes of the digestive tract and eyes even more congested. According to Basak *et al.* (2009), in human medicine, studies have reported individuals who, after contact with the plant's milky sap, experienced keratouveitis, corneal epithelial defect, and edema with mild anterior uveitis. The clinical signs usually begin immediately after contact with the latex, which confers a burning sensation, pain, photophobia and tearing that worsens over hours. Even after massive irrigation, the corneal epithelium may be intact or exhibit mild punctate epitheliopathy, which may eventually show frank epithelial defect the following day. Stromal edema with Descemet's fold may occur, which diminishes with time. These ocular structural alterations were not identified in the presented case, only intense congestion of the ocular mucous membranes and episcleral vessels; however, she exhibited restlessness, so we cannot deny the possible contact of latex with the ocular structures. The hemorrhages observed in the esophagus, trachea, stomach, and intestines are attributed to the perforations caused by the thorns found in the digestive tract, which are responsible for hematemesis, hematochezia, and hemorrhagic gastroenteritis. Pain also triggers animals to ingest foreign bodies (Masson *et al.*, 2021), which in this case were few and small, because the stomach was already impacted by a large amount of the plant.

Based on the clinical signs, the dog showed neurological signs such as hyperthermia, tremors, mydriasis and motor incoordination, mental confusion, and agitation; despite the other clinical signs, the pain caused by the perforations and gastric impaction and respiratory difficulty caused by pulmonary edema were possibly strong enough to make this dog decompensated, mentally confused, agitated, and severely uncomfortable (Papazoglou; Patsikas; Rallis, 2003). However, we cannot measure the extent to which these clinical signs are attributable to toxic substances in *E. milii*. Studies point to phorbol esters as a toxic component isolated from the Euphorbiaceae family, including *E. milii* (Oliveira *et al.*, 2007; Okonkwo *et al.*, 2018). These esters are molecules derived from tetracyclic diterpenes and have been cited as responsible for the toxicity of *Jatropha curcas* when used in sheep feed, as a residue of the jatropha cake (King *et al.*, 2009; Ferreira *et al.*, 2012; Ribeiro, 2010; Araújo *et al.*, 2010). The wide variety of diterpenoids may explain the differences and potency among species of the Euphorbiaceae family. In addition to the dermatological effects such as contact dermatitis (irritation of the skin and conjunctivae and inflammation of the mucous membranes), it causes various systemic disorders, particularly gastrointestinal disorders such as apathy, decreased appetite, anorexia, dyspnea, moans, tachycardia, arrhythmia, jugular protrusion, occasional muscle tremors, salivation, vomiting, abdominal pain, arched back, pasty to liquid feces sometimes with mucus and streaks of blood, tenesmus, cold extremities, difficulty getting up, decubitus, and death in different domestic animals (Oliveira *et al.*, 2008; Nogueira; Andrade, 2011; Burrows; Tyrl, 2012). Many of these signs were observed in the case reported.

In general, the macro- and microscopic alterations found in cases of poisoning by plants from the Euphorbiaceae family are related to lesions in the digestive tract, lungs, kidneys, liver, spleen, heart, and central nervous system. These conditions cannot be compared to this dog, given the diversity of plants involved and the different species of animals affected; however, they have in common circulatory alterations in the same affected organs (congestion, pulmonary edema, and hemorrhages), as reported in some articles (Brito; Tokarnia, 1997; Al-Sultan; Hussein, 2006; Aslani *et al.*, 2007; Ferreira *et al.*, 2012; Pimentel *et al.*, 2012; Tokarnia *et al.*, 2012; Brito *et al.*, 2019; Machado *et al.*, 2022).

CONCLUSIONS

Ornamental plants are increasingly present in homes. Although they are apparently harmless to pets, many of them can cause serious poisoning that can lead to death. Even plants that are not normally eaten, in cases of stress, can be accidentally ingested, as is the case with *E. milii*, and cause impaction, perforation, congestion, hemorrhage, and death.

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