

REPORT 1/2022

Lotta Hämäläinen and Sanna Koivisto

RAPORTTI

Alphachloralose poisoning of cats and dogs notified to Finnish Safety and Chemicals Agency

Turvallisuus- ja kemikaalivirasto

tuikes



Alfakloralose poisoning of cats and dogs notified to Finnish Safety and Chemicals Agency

Tiivistelmä

Alfakloraloosi on keskushermoston toimintaan vaikuttava biosidi, jota käytetään jyrksijämyrkyissä. Se hyväksyttiin tehoaineeksi EU:ssa vuonna 2011 ja Turvallisuus- ja kemikaalivirasto (Tukes) myönsi myyntiluvat ensimmäisille alfakloraloosia sisältäville valmisteille vuonna 2015. Alfakloraloosivalmisteiden ei ajateltu aiheuttavan myrkytyksiä muille kuin kohde-eläimille, sillä valmisteita sai käyttää vain syöttölaatoissa ja sisätiloissa. Ensimmäinen kissan alfakloraloosimyrkytys todettiin loppuvuodesta 2018. Samoihin aikoihin eläinlääkäreille tuli hoidettavaksi kissoja, joilla epäiltiin äkillisten neurologisten oireiden perusteella alfakloraloosimyrkytystä. Kolme vuotta alfakloraloosivalmisteiden markkinoille tulon jälkeen epäiltyjen myrkytystapausten määrät nousivat kymmeniin tapauksiin vuosittain. Sama ilmiö huomattiin myös Ruotsissa ja Norjassa. Tiedot myrkytyksistä perustuvat Tukesille tehtyihin ilmoituksiin, sillä lemmikkieläinten myrkytyksiä ei tilastoida Suomessa. Tässä raportissa käsittelemme Tukesille ilmoitettuja lemmikkieläinten myrkytyksiä vuosilta 2018–2021.

Tukesille ilmoitettiin yhteensä 168 myrkytystapausta, jonka aiheuttajaksi epäiltiin alfakloraloosia. Suurin osa ilmoituksista koski kissoja (89 %) ja loput koiria, muiden lemmikkieläinten myrkytyksistä ei ilmoitettu. Eniten myrkytyksiä ilmeni vuonna 2020, jolloin ilmoitettiin yhteensä 64 tapausta.

Ilmoituksia epäilyistä alfakloraloosimyrkytyksistä ovat tehneet ennen kaikkea lemmikkien omistajat, mutta myös eläinlääkärit. Kaikissa ilmoitetuissa tapauksissa kissat olivat vapaasti ulkoilevia ja miltei kaikki pyydystivät hiiriä. Myrkytyksiä tapahtui eniten loppusyksystä (syys-joulukuu), jolloin jyrksijämyrkyä käytetään eniten. Alfakloraloosimyrkytystä epäiltiin esitietojen ja äkillisten, tyypillisten hermosto-oireiden perusteella. Myrkytyksen oireet kestivät pääosin 1–2 päivää. Kissoja hoitavien eläinlääkärien mukaan kissoilla havaittiin useampia oireita, joista yleisimmät olivat kouristukset, aivohermohäiriöt sekä alilämpö. Kissojen kuolleisuus oli 13,4 %, kun taas koirista vain yksi kuoli (5,3 %).

Kolmannes koirista oli saanut myrkytyksen syötyään alfakloraloosia sisältävää jyrksijämyrkyä, mutta yhdenkään kissan ei havaittu syövän alfakloraloosivalmisteita. Sen sijaan jotkut oirehtivat kissat olivat syöneet hiiren, oksentaneet hiiren jäämiä eläinlääkärillä tai niiden löytöpaikasta löytyi kuolleita hiiriä. Myös kahden koiran nähtiin syövän kuolleita jyrksijöitä. Nämä tapaukset vahvistavat epäilyjä lemmikkien myrkytyksistä myrkyttyneiden jyrksijöiden kautta. Suurimmassa osassa kissojen myrkytystapauksista myrkytystapa jäi kuitenkin epäselväksi.

Summary

Alphachloralose (AC) is a biocide used against mice and the first products were brought to market in 2015 in Finland. It was deemed as safe for non-target animals as it was to be used inside buildings only, in tamper resistant bait boxes. However, in 2018 veterinarians treated increasing numbers of cats with sudden neurological symptoms, and the first official AC poisoning of a cat was confirmed in late 2018. Since then, the number of notifications of suspected AC poisonings of companion animals to Tukes had risen drastically, with the peak year being 2020 with 64 reported cases.

A total of 168 suspected AC poisonings of pets were reported to Tukes by pet owners and veterinarians during 2018–2021. Most of the pets in question were cats (89 %) while the rest were dogs. Most poisonings occurred in late fall and early winter, coinciding with the peak season for rodenticide use as mice try to invade buildings. The most common symptoms were seizures, cranial nerve disorders, and hypothermia, and these appeared suddenly on healthy animals lasting for 1 to 2 days. The mortality rate for cats was 13,4 %, while only one dog died due to poisoning (5,3 %).

A third of the poisoned dogs had eaten AC products, while none of the cats were observed eating AC products. Rather, as all the cats were free roaming and known to hunt mice, they were more likely to suffer from secondary poisoning via poisoned mice. In fact, some had been seen eating rodents before the symptoms started, vomited the remains of mice at the veterinary clinic or dead mice were seen in the area where the intoxicated cat was found. However, in most cat cases the route of poisoning remained unknown.

Table of contents

Tiivistelmä	1
Summary	2
Introduction	4
The number of suspected AC poisonings	4
AC poisoning cases notified on the internet-based questionnaire form	6
Symptoms and treatment at the veterinary clinic	9
Route of poisoning	10
Poisoning incidents of wild animals	11
Conclusions	12
Acknowledgements	12
References	13

Introduction

Alphachloralose (later AC) is a biocidal active substance that is used in rodenticide baits to control mice. It has been approved as an active substance in 2011 (2009/93/EC) in the European Union. The Safety and Chemicals Agency (Tukes) is the competent authority for biocides in Finland and grants authorisations to biocidal products including rodenticides. Tukes authorised the first rodenticide with AC in 2015 and further products were authorised in the following year. At that time AC rodenticides were considered safe to non-target animals as long as the poisoned baits were used indoors in tamper resistant bait boxes.

At the end of 2018 Tukes received first voluntary notifications from pet owners and veterinarians on suspected AC poisonings of cats. At the same time, veterinarians were treating increasing numbers of healthy cats with sudden neurological symptoms, which were suspected to be caused by AC poisoning. In 2018, the Finnish Food Authority and Tukes reported the first confirmed AC poisoning in Finland in a euthanised cat with typical neurological symptoms¹. Suspected AC poisonings in cats were also reported from Sweden and Norway. In these countries the use of AC products was restricted to trained professionals only in 2019–2020. In Finland, AC products were restricted to be sold to consumers in prefilled bait stations only and a warning of pets' poisoning risk was added to the label in 2019–2020. The poisoning cases did not decrease after the new restrictions and thus the consumer use was forbidden also in Finland in December 2021, but due to appeal the authorisations are not in effect in spring 2022.

There is no systematic monitoring or statistics concerning animal poisonings in Finland and the Poison Control Centre does not give statistics on enquiries made on animal poisonings. Before 2018 Tukes got only sporadic notifications on rodenticide poisonings of animals, and they mainly concerned dogs that had accidentally eaten anticoagulant rodenticides. Three years after the introduction of AC products to Finnish market the notified poisoning cases increased from few cases to tens of cases per year. Veterinarians had not notified any poisoning cases to Tukes before 2018 while in the enquiry they inform 671 poisoning cases with more than half concerning rodenticides (Anonymous 2019). It is thus very likely that only a minor proportion of the poisoning cases have been notified to Tukes.

In this document, we report and analyse the poisoning cases notified to Tukes by pet owners and veterinarians in 2018–2021.

The number of suspected AC poisonings

A total of 192 poisoning cases regarding pets were reported to Tukes spanning from the end of 2018 to the end of 2021, of which 168 concerned AC, 13 anticoagulant rodenticides, and 11 where the cause could not be identified due to limited description of symptoms. Most AC notifications (94) were done either by telephone or email, while the rest (74) were reported using an internet-based questionnaire form designed specifically for reporting the poisoning of pets. Notifications were made by pet owners or veterinarians and most of the poisoned pets were treated by a veterinarian. Suspected AC poisonings were reported only in cats and dogs.

The time period of poisoning notifications spanned from the end of 2018 to 2021 and the number of notifications differed between years. The lowest number of cases was recorded in the first year from which the number rapidly increased, before peaking in 2020 with 64 cases. During the last year, the number of

¹ <https://tukes.fi/-/ruokavirasto-ja-tukes-suomen-ensimmainen-alfakloralooosimyrkytys-varmistettu-lemmikkielaimella#14606e73>

cases dropped compared to the previous year. One thing to note is that since the notifications started coming in late 2018, there could have been more poisoning cases earlier that year that were not notified.

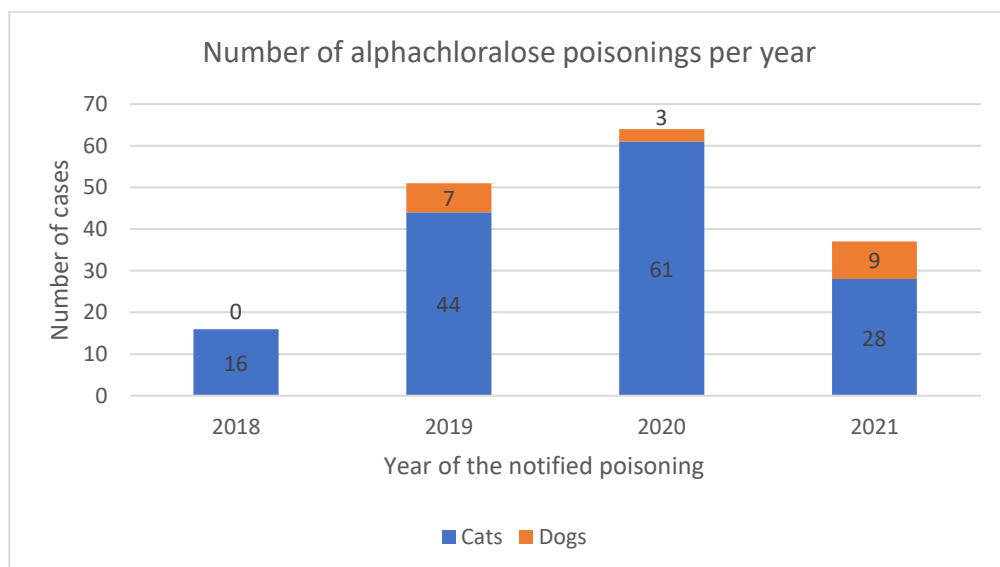


Figure 1. Number of alphachloralose poisoning notifications to Tukes per year.

Several reasons might explain the variation in the number of the AC poisoning cases per year. Firstly, because the notifications are voluntary, the public's interest and awareness may explain part of the variation between the years. There was a lot of media coverage on AC poisonings in 2019–2020. In addition, Tukes published press releases on the poisoning cases and risks of AC products^{2,3}. After that, when the issue was not topical anymore, the public's interest in AC poisonings may have diminished.

Secondly, the number of poisoning cases seems to follow the sales of AC containing rodenticides with a lag of about a year. In 2018–2019 the marketing for AC containing rodenticides was quite intense which probably increased sales. The end of intensive marketing campaigns and the negative publicity around the suspected pets' poisonings probably decreased the sales of AC products.

Thirdly, due to the rising number of suspected AC poisoning notifications, in late 2019 and early 2020 Tukes amended the authorisation conditions to better protect non-target animals from AC poisoning. AC rodenticides had to be sold to consumers in prefilled bait boxes and the package had to contain warnings stating that the product is dangerous to companion animals. The amendments came into force immediately. Despite the new restrictions, AC poisoning cases did not decrease, but instead peaked in 2020. It's important to note that some people probably used rodenticides purchased in previous years and thus did not see the new warnings.

When comparing the number of poisoning cases by species, cats were more often intoxicated with AC than dogs. Approximately 89 % of all reported cases concerned cats, while dogs made up 11 %. During the recent years, AC products seem to have become a problem particularly for cats as the majority of rodenticide poisonings before 2018 concerned anticoagulant rodenticides and dogs (Anonymous 2019). Cats are more

² [Ajankohtaista | Turvallisuus- ja kemikaalivirasto \(Tukes\)](#)

³ [Ajankohtaista | Turvallisuus- ja kemikaalivirasto \(Tukes\)](#)

sensitive to AC than dogs with estimated LD₅₀ of 100-250 mg/kg and 600 mg/kg, respectively⁴. One explanation for higher sensitivity could be cat's poorer ability to metabolise and eliminate AC (Segev et al 2006, Bernhoft et al 2020). Since most cats that were poisoned were free roaming and mice hunting, they had a bigger risk of encountering and eating intoxicated mice and thus getting poisoned. Dogs on the other hand are generally walked in leashes, thus lacking the opportunity to encounter so many rodents or to interact with them freely.

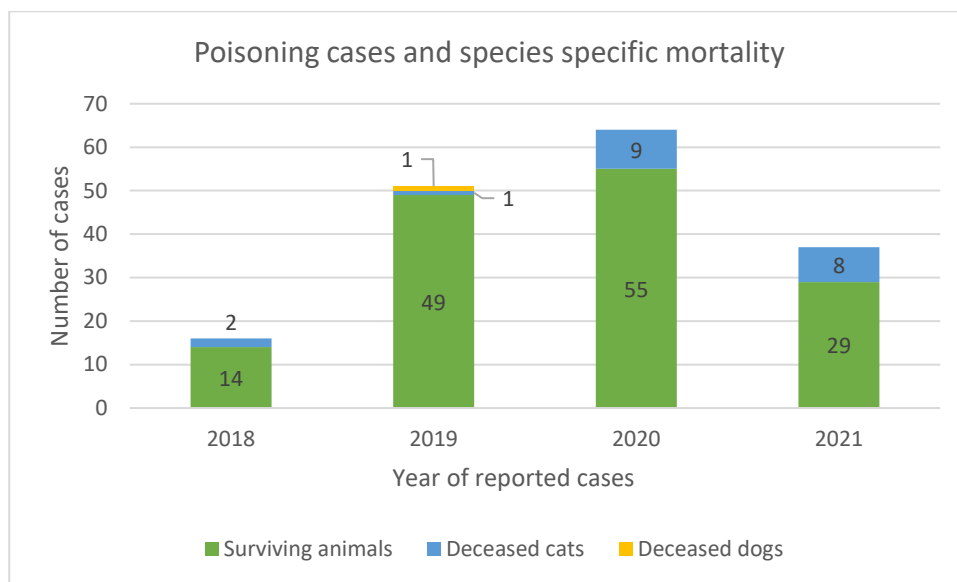


Fig. 2. Number of notified alphachloralose poisonings with species specific mortality.

While AC poisoning cases have been numerous, most of the poisoned animals survived. Of all 168 cases only 21 resulted in death or euthanasia, giving an overall mortality rate of 12,5 %, while the mortality rate for cats was 13,4 %. The true mortality of cats might be somewhat higher, because the fate of some animals was unclear at the time of notification. Because only one dog died, it's difficult to draw conclusions on the canine mortality rate.

In general, prognosis of AC poisonings is quite good. Reported mortality in companion animals differs between 6 and 27 % (Segev et al 2006, Bernhoft et al 2020). According to the latter study, pets that were found early or were able to come back home themselves and then had supportive treatment at a veterinary clinic survived at a higher rate compared to animals that remained outside.

AC poisoning cases notified on the internet-based questionnaire form

The internet-based questionnaire form⁵ for reporting the suspected rodenticide poisoning cases of pets was launched in November 2020 by Tukes. The form includes questions about the animal in question, details regarding the poisoning and survival, and background information on the case. Notification on a

⁴ [Information on biocides \(europa.eu\)](https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32008R0609), Section 6.13

⁵ <https://link.webropolsurveys.com/Participation/Public/4424c1ac-92bc-4d8f-a94f-5662a602229b?displayId=Fin2143588>

poisoning case can be made by a pet owner, veterinarian, or other person. A special form is opened for veterinarians treating poisoned cats with more detailed questions for symptoms and treatment.

A total of 74 cases were reported using the form for pets' rodenticide poisonings of which 72 % came from pet owners, 27 % by veterinarians, and 1 % by other persons. Most of the cases concerned cats while about 15 % were dogs.

A typical case was an adult male cat, free ranging in the countryside and hunting mice. Cats of all ages got poisoned, but most commonly adults (3 to 6 years old) and mature (11 to 14 years) cats. Over half of the cats were male and the rest were females. Majority of cats were from countryside, a couple from urban and the rest from suburban areas. All cats were free ranging, meaning that they were allowed to roam freely outdoors without supervision. Male cats have bigger home ranges than females (Kays et al 2020). With a bigger home range there are more chances to encounter poisoned rodents, which could explain the higher proportion of poisoned males.

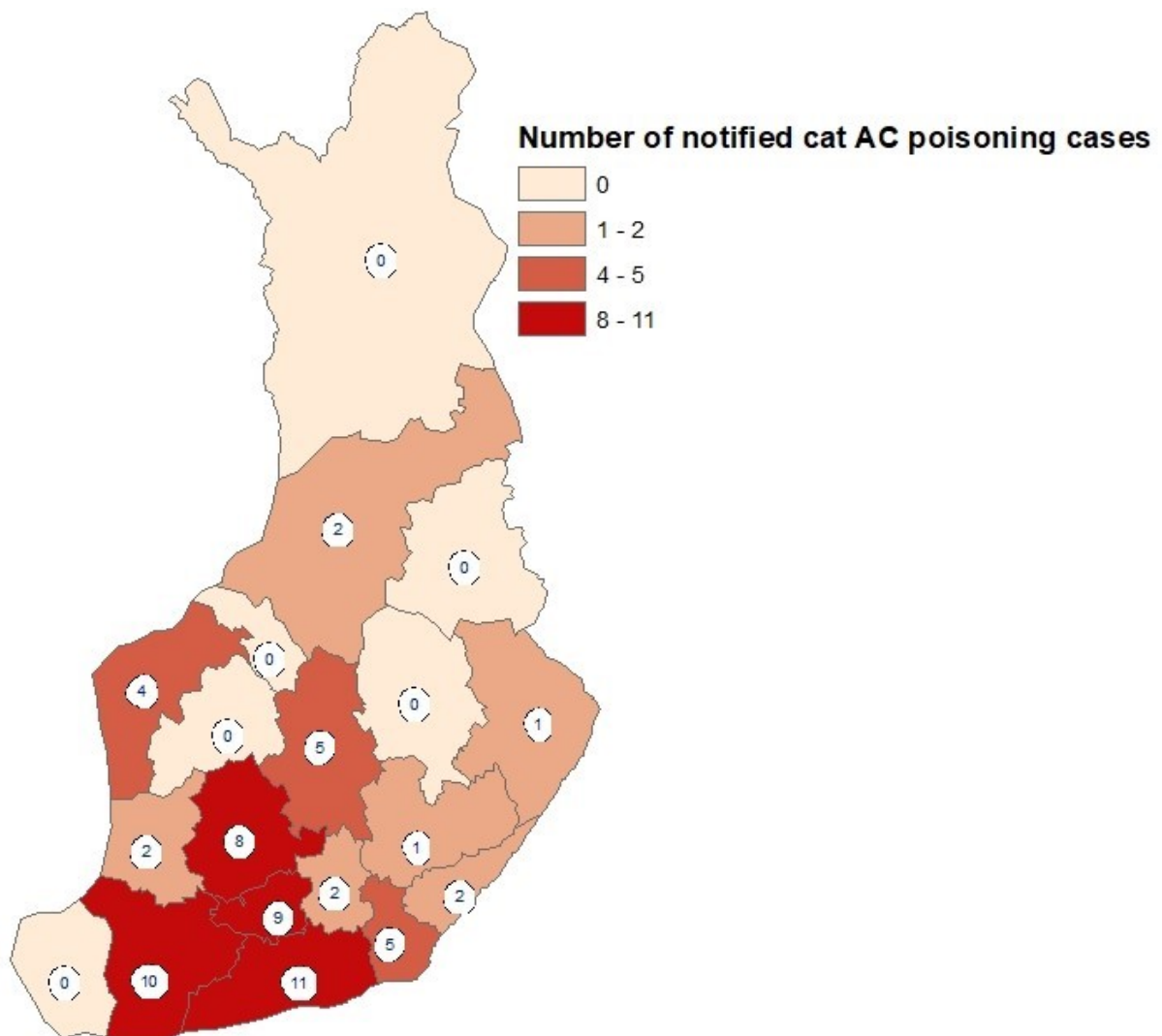


Fig. 3. Regional distribution of the notified AC cat poisoning cases given using the internet-based questionnaire form. The number inside the regions tells the total of cases in that region. One notifier didn't disclose their region.

Most of the cats were known to hunt mice or other rodents. AC is a narcotic and makes the intoxicated rodents slower to react. Since 72 % of all the prey cats hunt are rodents (Kauhala et al 2015), these slowly moving and stumbling mice are easy targets for rodent hunting cats.

Among the poisoned dogs there were individuals of all ages and both sexes. Also, most of the dogs were said to be free ranging and a little over half of them were known to hunt rodents. Majority of the dogs lived in countryside and the rest in suburban areas.

Most of the reported cats (78 %) were treated by a veterinarian and all but one reported dog. While no dogs died or had to be euthanised, nine (18 %) of the 49 cats treated by a veterinarian were euthanised and three (6 %) died at the clinic during treatment. Cats were euthanised due to severe symptoms and financial concerns. Four of the nine cats that hadn't been treated by a veterinarian didn't survive. One owner mentioned that their cat died so fast that they didn't even have time to go to the clinic.

While there was at least one cat poisoning case every month, there were a lot more cases in the fall and early winter months (Sept-Dec). There were so few cases of dogs that clear conclusions are difficult to draw. Four notifiers, three cat owners and one dog owner, only gave the year of the incident, but not the month.

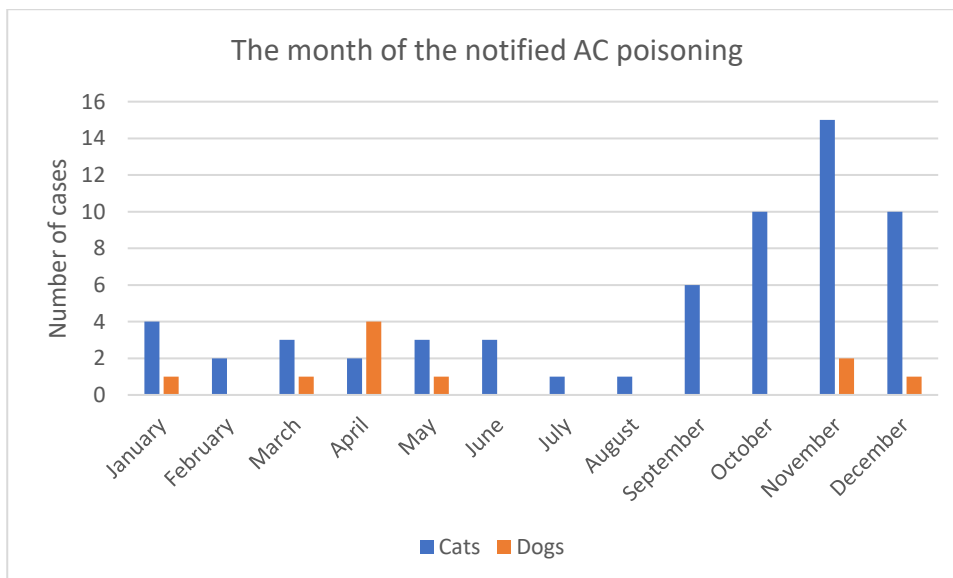


Fig. 4. Month of notified poisonings during 2018–2021. While poisonings happened in all months, many of the poisonings of cats happened in late fall.

In the fall mice try to enter dwellings and in response people use more rodenticides and traps. Increased rodenticide use increases the risk for free ranging and mice hunting cats coming across intoxicated rodents. This could explain why so many of the cats' poisonings happen during this time of the year.

In most cases the symptoms of AC intoxication lasted for a day or two, less often three. There were some cases where symptoms were said to last four days or longer, but they were rare. Dogs showed a similar pattern where the symptoms usually lasted for one or two days. This is in line with previous literature (Segev et al 2006).

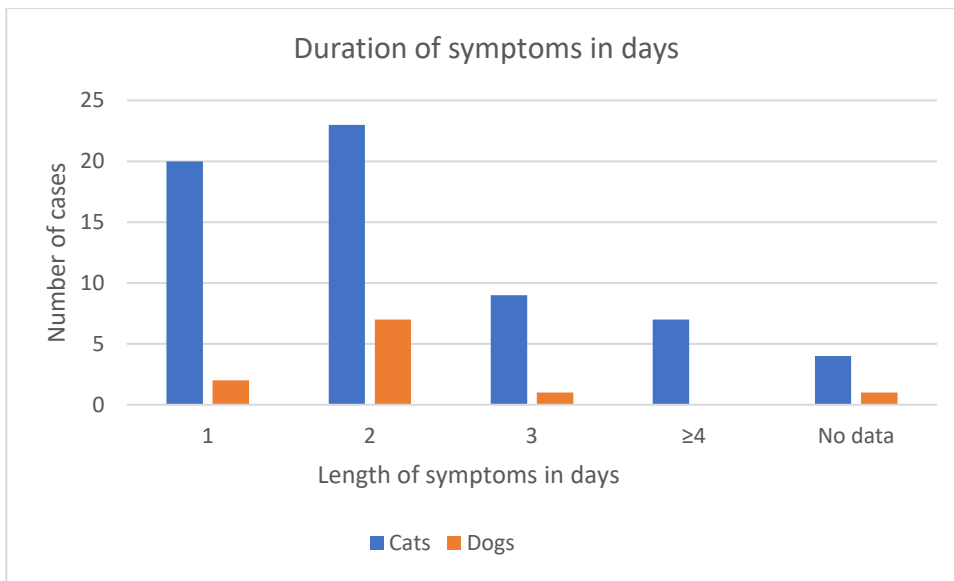


Fig. 5. The symptoms of the poisoning usually lasted 1–2 days.

The onset of symptoms after ingesting the poison was fast. Two dog owners mentioned that their pets showed symptoms 15 to 30 minutes after exposure to AC. One cat owner said that their cat came back home an hour after being let out showing clear AC intoxication symptoms.

Symptoms and treatment at the veterinary clinic

The questionnaire form had more detailed questions for veterinarians treating cats with suspected AC poisoning. Special attention was paid to symptoms and treatment. Veterinarians were also asked how they came to suspect AC poisoning.

14 notifications were done by veterinarians treating cats with suspected AC poisoning. All cats had more than one symptom. The most common symptoms were seizures and cranial nerve disorders (79 %) along with low body temperature (hypothermia, 71 %). Other common symptoms were abnormally strong reactions to stimuli (hyperesthesia, 64 %) and uncoordinated movement (ataxia, 57 %). Less common and rare symptoms were somnolence, tremors, salivation, slow heart rate (bradycardia), and being awake but unable to move (43 %), as well as behavioural changes (36 %), visual impairment (29 %), stupor, slow breathing rate (bradypnea), and coma (21 %). The symptoms reported by veterinarians are similar to the ones described previously in AC poisonings in cats and dogs in literature (Segev et al 2006, Grau-Roma et al 2016).

Since there is no antidote for AC poisoning, the treatment is supportive in nature. In these cases, veterinary care consisted mostly of intravenous fluid therapy and anticonvulsive and sedative medication along with intravenous lipid emulsion (intralipid). Two cats were euthanised because of severe symptoms and the other due to old age as well, and one died at the clinic during treatment.

Veterinarians diagnosed the AC poisoning either based on anamnesis and symptoms or symptoms only. In three cases veterinarians had noted that several cats from the same area had been treated for similar symptoms indicating the same source of poison. Some veterinarians considered other diagnoses at first,

but in one case only the diagnosis was not clear and other diagnoses remained relevant. Veterinarians can diagnose AC poisoning by symptoms alone. In a study by Windahl and colleagues (2021), AC was detected in all cats that had a preliminary diagnosis of acute AC poisoning based on clinical symptoms.

Tukes requested statements from the Finnish Food Authority and the Finnish Veterinary Association in connection to amendment of authorisations of AC products in 2021. Both the Finnish Food Authority and the Finnish Veterinary Association emphasise in their statements the suffering that AC poisoning causes to the poisoned animal. The neurological symptoms of AC are severe and progress fast, and the tremors and seizures cause at least moderate pain even if the animal were to survive. They consider this to be significant and unnecessary suffering which is against the Animal Welfare Act.

Route of poisoning

There are two ways of exposure to rodenticides. In primary poisoning the bait is consumed and in secondary poisoning, a living or dead poisoned rodent is eaten by a predator or scavenger. While one third of poisoned dogs ate AC baits, no cats were observed to do so. If cats were as prone as dogs to eat rodenticide products, we would see some observations or other evidence of cats eating the poisoned baits. In contrast, dogs have eaten AC products at home leaving torn packages as evidence or defecated the remains of rodenticide packages. Such evidence on direct eating of baits was not reported for any of the cats. In addition, since cats are obligate carnivores, they are not considered to prefer rodenticide baits with grains as the major ingredient.

While the exact cause of poisoning was not confirmed, secondary poisoning via mice was strongly suspected in several cats and dogs. Since all cats were free ranging and almost all hunted mice, encounters with poisoned mice were possible. Nine cats (6 %) had been seen eating a mouse before the symptoms of poisoning started and five cats (3 %) vomited the remains of eaten mice at a veterinary clinic. In addition, in three cases (2 %) dead mice were seen in or near the place where the poisoned cat had been found. One cat owner mentioned that their neighbour uses rodenticides in his farm, and often sees the owner's cats hunt mice on their property. Secondary poisoning has not been proven by scientific studies, but Bernhoft and colleagues (2020) calculated that it is possible for a cat to get poisoned via AC poisoned mice. However, in most cat poisoning cases (89 %), the route of the poisoning remained unknown.

Two dogs too had been seen eating a rodent caught by a cat before the symptoms of poisoning started. Dead mice were seen near four intoxicated dogs who all were known to hunt and eat rodents.

Table 1. The route of suspected poisoning divided by species. In most cat cases the route of poisoning is unknown.

Route of poisoning	Cats	Dogs
Cat or dog ate AC products before the start of the poisoning symptoms (visual observations, leftovers of packages in faeces)	0	6
Cat or dog ate a mouse before the start of the poisoning symptoms (visual observations, remains of mice in vomit)	14	2
Dead mice were seen where the cat or dog suffering from poisoning symptoms was found	3	4
The source of the poison remained unknown	132	7
Total number of cases	149	19

Most of the pet owners didn't use rodenticides, as only four cat owners (3 %) and four dog owners (21 %) mentioned using them. All pet owners used them indoors only. While at least eighteen neighbours of cat owners (12 %) used rodenticides, of which seven (5 %) used them outdoors against the authorisation conditions. All four dog owners' neighbours (21 %) who used rodenticides used them outside too. While there was one mention of a dog owner's neighbour strewing the baits directly on their yard, all others used the appropriate bait boxes. None of the neighbours had informed the pet owners about their use of AC products and the risk they pose to cats and dogs, even though it was required due to tightened authorisation conditions in 2019–2020. All the rodenticides mentioned by name in connection to poisoning cases have been authorised by Tukes⁶.

Several cats got poisoned more than once. Most of these were mentioned by veterinarians who had treated the same individual twice. In one case the cat survived the first intoxication, but the second that happened just after the first one proved fatal. According to the owner, they didn't let their cat roam freely after the first poisoning, but still allowed the animal to spend time outdoors, presumably in their own yard. As the poisoned mice are not expected to die immediately, they can move from one yard to another after eating the bait. Another cat allegedly spent time only in the owner's own yard, but still got poisoned.

Poisoning incidents of wild animals

As AC poisoning have been reported in companion animals, it most likely is possible for wild animals too, but more difficult to observe and report. Traces of anticoagulant rodenticides were found in many rodent eating predators e.g., foxes, raccoon dogs, least weasels, cats, goshawks, and tawny owls (Koivisto et al 2016). It can be assumed that the same animals that were exposed to anticoagulant rodenticides can also be exposed to AC. According to the Finnish Food Authority's statement, since 2018 one dead least weasel (*Mustela nivalis*) with neurological symptoms was examined and AC poisoning was suspected. Since AC doesn't cause pathological changes and AC analysis was not performed, the case remained suspect. However, this suggests that all non-target animals that feed on rodents close to residential or farm buildings can be exposed to AC.

In their statement, The Finnish Food Authority remark that all wild animals are at a greater risk of fatal intoxication compared to companion and farm animals that are kept by humans, because AC intoxication impairs normal functions and leaves the wild animal totally defenceless in the nature. In addition, being outside exacerbates the hypothermia that is a usual symptom of AC poisoning, which reduces the chances of survival. Birds are especially vulnerable as their LD₅₀ value for AC is lower than in mammals. Due to their hollow bones, they are lighter in weight, meaning that for similar sized animals, birds are more severely affected by the same amount of poison.

One notification of a wild, non-target animal has been made to Tukes. An ornithologist had used an AC product near a bird feeding station, although indoor use only is allowed. Several dead mice were near the station and a Eurasian pygmy owl (*Glaucidium passerinum*) ate one partially. Despite not even having eaten a whole mouse, the owl quickly became stupefied. After recuperating inside a building, the owl recovered and could be released back to nature.

⁶ [Biosidit - KemiDigi](#)

Conclusions

Alphachlorose is a rodenticide against mice that came to the Finnish market in 2015. First notifications of pets' AC poisonings were made in 2018 and the first case was confirmed later in the year by analysing alphachlorose in the cat's liver and urine. From a few notified cases per year, the number quickly rose to tens, with a peak year of 2020 with 64 suspected cases, despite new stricter authorisation conditions.

Most of the poisoning cases concerned cats. The mortality rate for cats was 13,4 % and one dog died due to poisoning. Most poisonings happened in the fall coinciding with the peak use of rodenticides when mice invade buildings and people try to deter them.

The symptoms of the poisoning, which most commonly were seizures, cranial nerve disorders, and low body temperature, suddenly appeared in a healthy animal. They usually lasted for one to two days.

While one third of dogs had eaten the rodenticide and thus suffered from primary poisoning, no cats had been seen eating the alphachlorose products. All the cats were free roaming and most of them were known to hunt mice, so secondary poisoning via poisoned mice is considered likely. Some cats had been seen eating mice before the symptoms started or dead mice had been found near the animal. In addition, few cats vomited parts of eaten mice at a veterinary clinic.

One notification concerned a wild non-target predator animal. Thus, all animals that eat mice close to settlement or farm buildings are at risk of AC poisoning, not just pets.

Acknowledgements

We thank pet owners and veterinarians for notifying suspected poisonings cases to Tukes. We thank Oskari Hanninen, Sari Penttinen, Elina Rydman and Outi Simola for valuable comments on the manuscript.

References

- Anonymous (2019): Lemmikkieläinten alfakloraloosimyrkytykset uusi ilmiö Suomessa. Suomen Eläinlääkärilehti 125: 383
- Bernhoft A, Sandvik M & Valheim M (2020): Alpha-chloralose poisoning in cats and dogs in Norway – a project. Report 16b – 2020 of the Norwegian Veterinary Institute (Veterinærinstituttet)
- Grau-Roma L, Stephens A, Wessmann A, Carmichael N & de Brot S (2016): α -Chloralose poisoning in a cat. – *Veterinary Record Case Reports* 4: e000313.
- Kauhala K, Talvitie K & Vuorisalo T (2015): Free-ranging house cats in urban and rural areas in the north: useful rodent killers or harmful bird predators? – *Folia Zoologica* 64: 45-55.
- Koivisto E, Koivisto P, Hanski IK, Korkolainen T, Vuorisalo T, Karhilahti A, Välttilä V, Loivamaa I & Koivisto S (2016): Prevalence of anticoagulant rodenticides in non-target predators and scavengers in Finland. Report of the Finnish Safety and Chemicals Agency (Tukes).
- Segev G, Yas-Natan E, Shlosberg A & Aroch I (2006): Alpha-chloralose poisoning in dogs and cats: A respective study of 33 canine and 13 feline confirmed cases. – *The Veterinary Journal* 172: 109-113.
- Windahl U, Lundgren S, Sprycha M, Tegner C, Dreimanis K & Tevell Åberg A (2021): Alpha-Chloralose in Feline Blood and Application on Blood Samples Collected from Cats with Symptoms of Alpha-Chloralose Poisoning. – *Journal of Analytical Toxicology*, bkab087, 1-7. <https://doi.org/10.1093/jat/bkab087>