

Unintentional exposure of young children to camphor and eucalyptus oils

Zorina Flaman RN¹, Sandra Pellechia-Clarke RN¹, Benoit Bailey MD², Michael McGuigan MD^{1,2}
¹Ontario Regional Poison Information Centre and ²Division of Clinical Pharmacology and Toxicology, The Hospital for Sick Children, Toronto, Ontario

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BACKGROUND: Essential oils, such as camphorated and eucalyptus oils, are volatile oils that can be absorbed by mouth and through the skin; if ingested orally by children, they can be harmful, even life-threatening.

OBJECTIVE: To determine the frequency of essential oil ingestion among children in Toronto, Ontario.

METHODS: Charts from December 1995 through March 1997 at the Ontario Regional Poison Information Centre, The Hospital for Sick Children, Toronto were reviewed to collect information on calls about essential oil ingestion, and a search of MEDLINE articles from 1966 to 1998 was conducted using the key words: 'camphor', 'eucalyptus', 'paediatric', and 'poisoning'.

RESULTS: Callers to the Poison Information Centre reported that 251 children had ingested an essential oil or product: eucalyptus oil 50 children; camphorated oil 18 children; VapAir (Drug Trading, Canada) vaporizing liquid 93 children; and Vicks VaporRub (Procter & Gamble, Canada) 90 children. The most common symptoms were cough, vomiting and cough associated with vomiting. Two children had seizures but recovered. The MEDLINE search found 18 reports of paediatric ingestion of the oils or oil products. The main symptoms were vomiting, lethargy, coma and seizures. One child died.

CONCLUSION: Although widely used by health care consumers, essential oils and the products that contain them can be harmful when ingested by children. Further education for parents and other caregivers about the risks involved in exposure to these products is required.

Key Words: *Camphor; Eucalyptus; Paediatric; Poisoning*

L'exposition non intentionnelle des jeunes enfants à l'huile camphrée ou d'eucalyptus

HISTORIQUE : Les huiles essentielles, comme l'huile camphrée et l'huile d'eucalyptus, sont des huiles volatiles qui peuvent être absorbées par la bouche et par la peau. Si elles sont ingérées par un enfant, elles peuvent être nuisibles et même mettre la vie en danger.

OBJECTIF : Déterminer la fréquence d'ingestion d'huiles essentielles chez les enfants de Toronto, en Ontario.

MÉTHODOLOGIE : Les dossiers de décembre 1995 à mars 1997 au Centre d'information antipoison régional de l'Ontario de *The Hospital for Sick Children*, à Toronto, ont été examinés pour obtenir de l'information sur les appels reliés à l'ingestion d'huile essentielle, et une recherche dans les articles de MEDLINE entre 1966 et 1998 a été effectuée au moyen des mots-clés «camphre», «eucalyptus», «pédiatrie» et «empoisonnement».

RÉSULTATS : Les demandeurs du Centre d'information antipoison ont déclaré que 251 enfants avaient ingéré de l'huile essentielle ou un produit en contenant. Cinquante enfants avaient pris de l'huile d'eucalyptus, 18, de l'huile camphrée, 93, du liquide vaporisateur VapAir (Drug Trading, Canada), et 90, du Vicks Vaporub (Procter & Gamble, Canada). Les symptômes les plus courants étaient une toux, des vomissements et une toux accompagnée de vomissements. Deux enfants ont eu des convulsions mais se sont rétablis. La recherche dans MEDLINE a permis de dénicher 18 déclarations d'ingestion pédiatrique d'huiles essentielles ou de produits de ces huiles. Les principaux symptômes étaient les vomissements, la léthargie, le coma et les convulsions. Un enfant est décédé.

CONCLUSION : Bien qu'ils soient largement utilisés par les consommateurs de soins de santé, les huiles essentielles et les produits en renfermant peuvent être nuisibles s'ils sont ingérés par des enfants. Il est nécessaire de mieux informer les parents et les autres éducateurs sur les risques reliés à l'exposition à ces produits.

Essential oils are volatile oils that have been used for centuries as topical rubefacients, analgesics and antipyretics. They are found in many over-the-counter reme-

dies, and are inexpensive and widely used in the treatment of coughs due to colds. The essential oil products frequently encountered in poisonings are camphorated oil

(20% camphor), eucalyptus oil (70%) or a combination in Vicks VaporRub (Procter & Gamble, Canada) ointment (4.3% camphor, 6% eucalyptus oil, 4% menthol), VapAir (Drug Trading, Canada) vaporizing liquid (2% camphor, 6% eucalyptus oil, 4% menthol) and Camphor-Phenique (Bayer Corporation, USA) (10.8% camphor, 4.7% phenol). Parents and caregivers may not be aware of the potentially toxic effects of these oils and products if they are ingested orally by an infant or a child.

The clinical effects of camphorated oil are gastrointestinal irritation and central nervous system (CNS) depression. Symptoms usually begin within 5 to 10 min of ingestion, and peak within 90 min. The death of a small child occurred after the ingestion of 5 mL of camphorated oil (1). Camphorated oil is a CNS stimulant whose effects range from mild excitation to grand mal seizures or status epilepticus (2). It causes an abrupt onset of seizures 20 to 30 min after ingestion (1).

The clinical effects of eucalyptus oil preparations are epigastric pain, vomiting and CNS symptoms. CNS symptoms can develop within 30 min, although the onset may be delayed for up to 4 h. Ingestion of 3 to 5 mL of pure eucalyptus oil has caused transient coma and even seizures (1). The toxic effects of eucalyptus oil alone include a burning sensation in the mouth and throat, spontaneous vomiting, respiratory difficulty and CNS depression progressing to seizures.

The objectives of the present study were to determine the frequency of essential oil ingestion by children in Toronto; to identify the products involved; to report morbidity and mortality; and to describe the most common symptoms to alert parents and caregivers about the dangers that essential oil products pose to children.

PATIENTS AND METHODS

All telephone calls about unintentional ingestion of essential oils by children one to five years of age to the Poison Information Centre (PIC) at The Hospital for Sick Children, Toronto, Ontario from December 1995 to March 1997 were reviewed. Data were recorded using a standardized collection instrument. The authors wanted to monitor essential oil calls during two winter seasons. Specific information gathered included the age of the patient, substance ingested, concentration of the substance, amount ingested, time of the call, advice given and the patient's condition at follow-up. In addition, a search of MEDLINE articles from 1966 to 1998 was conducted using the key words 'camphor', 'eucalyptus', 'paediatric' and 'poisonings'. The findings of relevant reports that were identified by the search were summarized.

RESULTS

The number of calls to the PIC that related to unintentional oral ingestion of essential oils was 251. Fifty children (20%) ingested eucalyptus oil, 18 (7%) consumed camphorated oil, 90 (36%) ate Vicks VapoRub and 93 (37%) ingested VapAir vaporizing liquid. Table 1 presents

TABLE 1: Symptoms reported to the Poison Information Centre (PIC), The Hospital for Sick Children, Toronto, Ontario due to the ingestion of essential oils and their products

Symptoms reported	Number of calls related to oral ingestion of essential oils, n=251 (% of total calls)
Cough	9 (3.5%)
Vomiting	5 (1.9%)
Cough and vomiting	5 (1.9%)
Burning sensation in mouth	3 (1.9%)
Drowsiness	2 (0.8%)
Seizures	2 (0.8%)
Ataxia	1 (0.04%)
Burning sensation to the eyes	1 (0.04%)
Sweating	1 (0.04%)

the patients' reported clinical effects at the time of the call to the PIC. Based on the average number of calls to the PIC, calls about essential oil exposures in children older than one year of age represented one call in 500. During the time of the study, the PIC received a total of 100,000 calls.

Most calls (97%) to the PIC were made by parents and caregivers; the remainder were made by hospital emergency department staff. Of the 244 calls made by parents and caregivers, only 29 callers (11%) reported symptoms while at home (Table 1). However, 76 children (29%) were referred to an acute care facility. Even though most of the children displayed no symptoms, they had ingested a sufficient amount of essential oils to warrant prompt medical attention. Fifty-seven children received activated charcoal in hospital. None of the 76 children died as a result of the exposures. With the exception of two patients who had seizures, all symptoms in the children resolved spontaneously. The cases of the children who experienced seizures are described below.

A 14-month-old male (11.3 kg) ingested an unknown amount of camphorated oil 20% and spilled a large amount on his clothing. Five minutes later his caregiver called the PIC and, based on advice received, took the boy by ambulance to the nearest emergency department. One hour after exposure, the child had two generalized tonic-clonic seizures that lasted approximately 3 min each. The child then became drowsy but responded to touch. Seven hours after exposure, he was awake and alert. He was observed for a further 24 h after admission, then discharged.

A 19-month-old female (10.7 kg) ate approximately 50 mL of Vicks VapoRub ointment. One hour later she had a seizure at home and appeared lethargic afterwards. Her parent did not take her to an acute care hospital until 4 h after exposure. On arrival at the emergency department, the toddler was asymptomatic. She remained seizure-free and was discharged 24 h after admission.

TABLE 2: Findings of case studies on ingestion of essential oils and their products by children identified by a MEDLINE search

Reference	Age of child	Substance ingested	Amount ingested (mL)	Time of onset of symptoms after ingestion	Symptoms
Craig (3)	5 years	Camphorated oil	5	1 h	Twitch
Craig (3)	4 years	Camphorated oil	30	4 min	Seizure and coma
Skoglund et al (10)	15 months	Spirits of camphor	NA	48 h	Seizures and ataxia
Hindle (15)	11 months	Eucalyptus oil	10 to 15	NA	Lethargy and seizure
Hindle (15)	18 months	Eucalyptus oil	NA	NA	None
Spoerke et al (14)	2.5 years	Eucalyptus oil	5	45 min	Listlessness
Gibson et al (13)	2 years	Camphor-Phenique (Bayer Corporation, USA)	9.5	10 min	Seizure
Webb, Pitt (5)	4 months	Eucalyptus oil	30	1 h	Drowsiness
Theis, Koren (16)	15 months	Eucalyptus oil	20	10 min	Seizure
Theis, Koren (16)	3 years	Eucalyptus oil	5	20 min	Seizure
Patel, Wiggins (11)	3 years	Eucalyptus oil	10	30 min	Coma
Gouin, Patel (17)	15 months	Vicks VaporRub (Procter & Gamble, Canada)	70	2 h	Seizure
Phelan (8)	3 years	Vicks VaporRub	15	2 h	Seizures
Phelan (8)	2 years	Camphor-Phenique	5 to 10	15 min	Vomiting

NA Not available

Forty-eight articles were found in the MEDLINE search: 18 articles reported cases of paediatric ingestion, 15 articles were written in a language other than English, 14 articles concerned adults and one letter reported statistics that were released by the United States-based National Clearing House for Poison Control Centres. The 18 articles of paediatric cases involved 19 children: four children ingested 5 to 20 mL of camphorated oil; nine children consumed 5 to 30 mL of eucalyptus oil; three children consumed 10 to 15 mL of Camphor-Phenique; two children ate 15 to 70 mL of Vicks VaporRub; and one child consumed an unknown amount of a vaporizing solution.

Six of the reports were surveys that involved a total of 612 children (2-7). The most common symptoms reported were vomiting, coma, lethargy and seizures. No deaths were reported. In one study of 109 cases of eucalyptus oil ingestion, 22 children received medical attention and seven children were admitted to hospital (7), while in another study, 31 of 41 children manifested no symptoms (5). A study of exposure to camphor reported that 174 of 182 patients were asymptomatic (2). However, another study of camphor exposure found that only 53% of 97 patients were symptom-free (4).

The remaining articles were case reports (8-17). Two of the surveys also reported some cases in detail (3,5). Table 2 presents in summary form important data from all but two of the case studies that were identified during the MEDLINE search. Those two articles (references 9 and 12) are omitted from Table 2, the former because of a scarcity of data and the latter because the case was atypical.

The sole case of a child who died following the ingestion of an essential oil was quite atypical (12). A six-month-old boy diagnosed with pneumonia became lethargic and was

admitted to hospital. An electroencephalogram showed diffuse slowing of brain activity. Questioning of the parents revealed that, earlier, the boy had been given a home remedy, apparently for cold symptoms, which contained unknown amounts of camphor and alcohol. The infant died five days after admission.

DISCUSSION

Based on the literature retrieved via MEDLINE and our review of calls to the PIC, two general points can be substantiated. First, exposure of children, especially very young children, to essential oil products has resulted in poisonings. Second, although very few exposures require medical attention, the effects can sometimes be serious.

The issue of treatment, by contrast, is less clear than the two substantiated points. The medical management of camphor and eucalyptus oil ingestion is mainly supportive care; specific treatments for ingestion vary widely in their known efficacy, as the following examples of three common treatments illustrate. The use of syrup of ipecac is not recommended because of the risk of an abrupt onset of seizures. The role of activated charcoal has not been studied, and its use in treatment is controversial. Camphor and eucalyptus oils, once ingested, are so widely distributed throughout the body that stimulating elimination is unlikely to help significantly. Some case reports have recommended hemoperfusion, but these reports are poorly substantiated (1).

CONCLUSIONS

Although essential oils have been used to treat coughs due to colds, reports in the literature document that they can be harmful when ingested. These reports were con-

firmed by an analysis of the experience at the Ontario Regional Poison Information Centre: two seizures were caused in one child by the ingestion of an unknown amount of camphorated oil, possibly 5 to 10 mL, and in another child, a seizure occurred following the ingestion of approximately 50 mL of Vicks VaporRub ointment. Parents and caregivers should be aware of the life-threatening risks of ingestion. Because these products are readily available and inexpensive, consumer education and awareness, improved labelling and the control of their sale should be considered. The authors believe that both a limi-

tation on the sale of camphor-containing products through government legislation and a decrease in the concentration of camphorated oil in consumer products can lessen the risk of exposure (18). The PIC plans to continue to educate parents, caregivers and the public about the risks involved in exposure to these products.

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