

Accidental Ingestion of Oil of Wintergreen

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Methyl salicylate in the form of oil of wintergreen is well known as a toxic, often fatal source of salicylate poisoning. Many lay persons do not realize the potential harm from what often seems an innocent topical ointment or candy flavoring. This case demonstrates the high concentration of salicylates in oil of wintergreen and illustrates how illiteracy may play a role in adult accidental ingestions.

This form of salicylate poisoning is rare in the United States, with 38 cases reported in 1981 to the Bureau of Poison Control of the Food and Drug Administration.¹ The earliest cases on record are found in the 1832 edition of *Beck's Elements of Medical Jurisprudence*.² In 1927 Stevenson³ presented three cases from the Johns Hopkins Hospital and reviewed the literature on the subject. His work established oil of wintergreen as a deadly poison. The usual lethal adult ingestion is 30 mL; however, in several cases as little as 6 mL has been fatal in an adult.¹ As little as 3 mL may be fatal in a child.

In the case presented it is suspected that minimal reading skills led to the ingestion of a fatal dose of wintergreen oil. The victim was attempting to buy what he thought was castor oil for use as a cold remedy. The product that he purchased, produced by the Carroll Co, is clearly labeled, including a warning "for external use only."

CASE REPORT

A 44-year-old man came to the emergency department on February 23, 1987, after he suffered a witnessed seizure. He had traveled to South Carolina from Kansas City, Missouri, 3 days before to attend the funeral of his mother. Upon arrival at the emergency department, he was extremely tachypneic and developed explosive diarrhea dur-

ing the initial evaluation. Questioning of family members revealed he had longstanding progressive systemic sclerosis and over the past week had upper respiratory tract infection symptoms. Further questioning of family and friends revealed he had a limited education and poor reading skills. There was no previous history of seizure disorder. His current medications were 5 mg of prednisone daily and 300 mg of theophylline twice a day. Six hours before his seizure he had gone to a local grocery store to purchase castor oil for use as a cold remedy. Early in his presentation he was able to give his medications by name and dose. He at all times vehemently denied any aspirin ingestion but did report he had ingested one half a bottle of "castor oil" as a cold remedy. Friends searched his car and found the above-noted prescription drugs and a 2-oz bottle of wintergreen oil, which was one-half empty.

The patient was a well-developed man who was tachypneic and diaphoretic, and who exhibited progressive confusion. His vital signs were blood pressure 130/76 mmHg, pulse 112 beats per minute, respirations 60/min, and a rectal temperature of 37.1°C (98.9°F).

On examination, the eyes, ears, nose, and throat were unremarkable. Cardiac examination revealed a regular rapid rhythm and no murmurs or extra sounds. Lungs were clear to auscultation. The abdomen was protuberant, without organomegaly or masses. There was no abdominal tenderness, and the bowel sounds were hyperactive. Findings on rectal examination and genital examination were unremarkable. The patient's fingers had extremely thickened skin on the dorsal aspects, and pitting edema (1+) of the ankles was noted.

The blood count was significant with a hemoglobin 150.9 g/L (15.9 g/dL) and hematocrit of 0.48, with the leukocyte count being $22.9 \times 10^9/L$ ($22,900 \text{ mm}^{-3}$). The differential count showed 0.85 segmented neutrophils, 0.03 band form neutrophils, and 0.12 lymphocytes. Electrolyte profile revealed the following: sodium 144 mmol/L (144 mEq/L), potassium 4.4 mmol/L (4.4 mEq/L), chloride 105 mmol/L (105 mEq/L), carbon dioxide 23.2 mmol/L (23.2 mEq/L), blood urea nitrogen 5.3 mmol/L (15 mg/dL), creatinine 132.6 $\mu\text{mol/L}$ (1.5 mg/dL), glucose 6.7 mmol/L (122 mg/dL) and osmolality 312 mmol/kg (312 mOsm). Arterial blood gas levels on room air were as follows: pH 7.36, Pco_2 4.13 kPa (31 mmHg), Po_2 8.58

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kPa (64.4 mmHg), bicarbonate 17.9 mmol/L (17.9 mEq/L), oxygen saturation 91.7%. Serum salicylate level was 56.6 mmol/L (78.3 mg/dL) at the time of admission; a repeat value after 2 hours was 62.9 mmol/L (87 mg/dL). Theophylline level was 31.0 μ mol/L (5.6 mg/dL). Screening tests of serum and urine for drugs were negative. Urinalysis was significant for a pH of 6.0. Lumbar puncture samples showed no organisms on the Gram stain, and Wellcogen studies were negative; cell studies on the cerebrospinal fluid were unremarkable. The electrocardiogram revealed a sinus tachycardia at a rate of 140 beats per minute. A computerized axial tomogram of the head was normal. Bibasilar fibrosis was noted on the chest radiograph.

While in the emergency department the urine was alkalinized to pH 7.5 with two ampules of bicarbonate. Nasogastric lavage was carried out and followed by charcoal lavage. The patient was admitted to the medical intensive care unit, where his rectal temperature climbed to 41°C (106°F), and he became increasingly confused. Acetaminophen suppositories, a cooling blanket, and alcohol baths were started. Hemodialysis was started 6 hours after presentation. Two hours into dialysis the patient had a cardiopulmonary arrest but responded quickly to resuscitation and was returned to the intensive care unit. Following his arrest he required mechanical ventilation and was given dopamine at a rate of 8.5 μ g/kg/min. Arterial blood gases on a tidal volume of 800 mL of intermittent mandatory ventilation of 16/min and an inspired oxygen flow of 0.50 were pH 7.04, P_{O_2} 8.2 kPa (62.4 mmHg), P_{CO_2} 9.35 kPa (70.2 mmHg), bicarbonate 15.7 mmol/L (15.7 mEq/L) and an oxygen saturation of 0.785. A chest radiograph at 10 hours after presentation was consistent with adult respiratory distress syndrome. After two ampules of bicarbonate and manipulation of ventilator parameters, pH improved to 7.47; however, his hypoxemia progressed. The patient required increasing concentrations of dopamine to maintain adequate blood pressure.

He had three episodes of cardiopulmonary arrest over the next 4 hours and died 18 hours after he entered the hospital.

DISCUSSION

Methyl salicylate is a potent toxin. Its pleasant odor and its use as an agent to flavor candies often causes its potential as a poison to be underestimated. To put into perspective the danger of this compound, the following formula is presented:⁴

$$(\text{milliliters of methyl salicylate} \times 1.568) \times \text{molecular weight of aspirin}^* / \text{molecular weight of methyl salicylate}^* = \text{equivalent weight of aspirin in grams}$$

This patient ingested approximately 30 mL of oil of wintergreen; the aspirin equivalent using the formula listed above would be 55.7, or the equivalent of 171.4 adult aspirins. This conversion illustrates the potency and potential toxicity of oil of wintergreen even in small quantities.

Illiteracy seems to have played a major role in this fatal ingestion and may be a common factor in accidental overdoses and ingestions in adults. Treatment is identical to the other salicylates. Early use of hemodialysis in conjunction with maximal supportive measures is encouraged in any significant ingestion of methyl salicylate.^{5,6}

Strong warning labels are recommended for household salicylate containing compounds such as oil of wintergreen.

*Aspirin molecular weight = 108.15; methyl salicylate molecular weight = 152.13

References

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