Case Report

Acute ethanol poisoning in a 6-year-old girl following ingestion of alcohol-based hand sanitizer at school

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BACKGROUND: Alcohol-based hand sanitizers (ABHSs) have been widely used in homes, workplaces and schools to prevent the spread of infectious diseases. We report a young child unintentionally ingested ABHS at a school, resulting in intoxication.

METHODS: The child was a 6-year-old girl who had been brought to the emergency department (ED) for hypothermia, altered mental status (AMS), periods of hypoventilation, hypothermia and vomiting. Computed tomography of her head revealed nothing abnormal in intracranial pathology. Urine drug screening was negative. Alcohol level was 205 mg/dL on admission. Other abnormal values included potassium of 2.8 mEq/L, osmolality of 340 mOsm/kg and no hypoglycemia. Further investigation revealed that the patient had gone frequently to the class restroom for ingestion of unknown quantities of ABHSs during the day. The patient was admitted for one day for intravenous fluid hydration and close observation of her mental status.

RESULTS: The patient was discharged from the hospital the next day without any complications.

CONCLUSION: Despite the large safety margin of ABHSs, emergency physicians need to be aware of the potential risk of ingestion of a large amount of such products in children and consider it in the assessment and management of school-age children with acute AMS.

KEY WORDS: Pediatrics; Toxicology; Ethanol; Hand-sanitizer; Altered mental status

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INTRODUCTION

ABHSs have been widely used in recent years in hospitals, households and schools for its ability to reduce transmission of gastrointestinal and respiratory illnesses, making it an essential part of the infection control programs at schools.[1,2] Common ABHSs use ethyl alcohol and/or isopropanol with their concentrations ranging from 60% to 65%. Intentional ingestion of hand sanitizers for its alcohol content leading to intoxication in adults has been reported.[3,4] Most recently, an unintentional ingestion of ABHSs in a 4-year-old child at home leading to significant intoxication has also been reported.[5] We present another case of unintentional ingestion of ABHSs in a 6-year-old girl.

Case report

An unresponsive 6-year-old girl was brought to the pediatric ED via emergency medical services (EMS). Her father picked up the girl from school who appeared drowsy for a "long day at school". By the time they arrived at home, the girl deteriorated rapidly from being lethargic with slurred speech to becoming unresponsive to any stimuli. Her medical history was unremarkable. In the ED, her vital signs were as follows: blood pressure

90/58 mm Hg, pulse rate 100 beats/min, respirations 12 breaths/min, temperature 35.7 °C elsius rectally, and oxygen saturation of 98% on room air. Glascow Coma Scale was 9, she was withdrawing from painful stimuli, with eyes opening to verbal stimulus, and incomprehensible speech. Her pupils were 5 mm, equal and reactive to light. The rest of her examinations were within normal limits including no chemical odor to her breath or any bruising. The initial bedside blood glucose was 123 mg/dL. A nasal airway was placed due to the altered mental status and periods of hypoventilation, and supplemental oxygen was administered. Chest X-ray revealed no acute cardiopulmonary abnormalities. Head and cervical spine computerized tomography (CT) were performed to exclude the possibility of any head and spinal trauma at school. Laboratory values included potassium 2.8 mEq/L, bicarbonate 20 mEq/L, anion gap 16 mmol/L, and glucose 126 mg/dL. Serum acetone was within normal limits. Calculated osmolality was 281 mOsm/kg, whereas actual osmolality was 340 mOsm/kg. The results of toxicological studies were negative for salicylates and acetaminophen, and urine screening was normal. However, her serum alcohol level was 205 mg/dL on admission. An investigation found that the teacher of the girl had noticed that she had gone frequently to the restroom during the school day, where there was an ABHS pump removed from the classroom to the restroom by another student. The girl was admitted to the hospital for intravenous fluid hydration, re-warming and close observation of her altered mental status. Later on, she ingested a small amount of hand sanitizer in the restroom that day because she "liked the taste". The girl was discharged from the hospital the next day without any complications.

DISCUSSION

The wide use of ABHSs for hand hygiene in schools, hospitals, offices, and public buildings leads to an increase in the pediatric exposure of such products, but there are no complications in most cases.[6,7] This is due primarily to ingestion of a less significant amount of the hand sanitizer, which causes no intoxication. Of interest, there are increasingly ABHSs with such flavors as warm vanilla sugar, Japanese cherry blossom, coconut lime verbena, and others that come in very attractive bottles. These products could be enticing to young children to ingest enough of them to cause significant intoxication. Our case suggests that young children at school may be at risk for significant intoxication from these products. The patient, weighing 24 kg, would have to ingest 55 mL of a 60% ethanol product to demonstrate a blood ethanol of 205 mg/dL. This is calculated by the Estimated Blood Level Calculator in Micromedex for ethanol (amount ingested X% alcohol ingested X specific gravity)/ Volume distribution X weight kg = 55 mL × 60% × 0.79 g/mL / 0.53 L/kg × 24 kg = Potential blood level of 205 mg/dL (44.5 mmol/L).[8] Measures taken to decrease potential toxicity of ABHSs in children include installation of hand sanitizer stations in schools, which can be appropriately supervised by the teachers and avoidance of food like labeling of hand sanitizers enticing young children to ingest these products.

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