

## Case Report

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# Accidental Ethanol Ingestion in a 32 Day Old Infant

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## Abstract

Alcohol exposure can occur in all age groups but occurs much less commonly in infants. Prior studies have shown that no level of alcohol exposure is safe, and can affect the brain and other areas of development. We report a 32 day old previously healthy male who presented to an outside hospital early morning for "not acting normal". Earlier that morning, mom had fed him 3 ounces of formula mistakenly prepared with a clear liquid thought to be water, but later confirmed to be gin. The baby was mildly agitated on arrival, and the blood alcohol level 4 hrs post-ingestion was 230 mg/dl. This is one of the youngest documented cases of alcohol ingestion, and was remarkable for having a mild course with normal vital signs and electrolytes, and a non-focal physical exam. This case highlights the importance of having a high level of suspicion for alcohol exposure and a low threshold for checking blood ethanol levels in infants presenting with altered mental status, as there may be no hallmark signs, symptoms, or electrolyte abnormalities.

**Keywords:** Ethanol; Bayley scales; Intoxication

## Case

We report a case of a 32 day old previously healthy male who presented to an outside hospital in the early morning with chief complaint of "not acting normal". The mother reported that she woke up at 4am and prepared a 4 ounce bottle of formula with Enfamil and water for the baby, and the baby drank 3 ounces of the formula. Approximately an hour later, she observed that the baby was not acting right [1]. The baby was having excessive oral secretions, shaking his arms up and down, and was agitated. The father later recalled that he had left clear undiluted gin that he had shared with his friend earlier that evening in a disposable water bottle on the nightstand next to the formula powder. Waking up in the middle of the night and mistaking it for water, the mother then used the alcohol while mixing the patient's formula. The patient was immediately taken to an outside hospital.

On arrival, the patient was afebrile with a heart rate of 150, respiratory rate of 28, temperature of 97.7, and oxygen saturation of 99%. Initial exam revealed a mildly agitated, somewhat somnolent male who appeared well hydrated. No obvious craniofacial abnormalities suggestive of Fetal Alcohol Syndrome. Head was atraumatic with a flat anterior fontanelle, and pupils were bilaterally equal, round, and reactive to light. Respirations were nonlabored and lungs were clear to auscultation bilaterally. Cardiac and abdominal exams were normal. Skin was warm and well perfused without bruises or lesions. Review of other systems yielded negative results. The mother denied any alcohol use during pregnancy or post-partum. Initial labs were drawn 3.5 hrs after ingestion of alcohol. His serum electrolytes, blood urea nitrogen, creatinine, bicarbonate, and glucose were within reference ranges. Blood alcohol level at 4 hrs post ingestion was 230 mg/dl and at 5 hrs 15 minutes was 211 mg/dl. Our institution was contacted as a tertiary care referral center and he was

subsequently transferred to our emergency department for further management. On arrival, he was sleepy, but could be aroused easily.

The Poison Control center was contacted for recommendations. His repeat blood glucose was normal and blood alcohol level 8 hrs later was 137 mg/dl. He had a blood alcohol elimination rate of 23 mg/dl/hour. His serum levels of acetaminophen and salicylates were negative. Urine drug screen was negative for cannabinoids, opiates, methadone, cocaine, benzodiazepines, barbiturates, amphetamines, and phencyclidine. He was admitted to the hospital for close monitoring of his laboratory values, especially his blood glucose and alcohol level, his level of consciousness, neurologic and respiratory exams. Since the patient was not completely awake initially, feeding was deferred and he was started on dextrose 5% and half normal saline at a maintenance rate. His blood alcohol level 24 hrs after ingestion decreased to 24 mg/dl. Social work and child protective services were contacted and evaluated their social and living situation prior to discharge.

## Discussion

We know that infants who were exposed to any level of alcohol in-utero are at increased risk for alcohol related damage including characteristic facial features, congenital heart defects, and mental and behavioral abnormalities [2,3].

Multiple scientific studies in the past have described the effects of alcohol intoxication that range from flushing, metabolic acidosis, hypothermia, hypoglycemia, bradycardia, and hypotension, to respiratory insufficiency, seizures, altered level of consciousness, and coma [4]. There are very few reports existent in current literature about alcohol ingestion in infants. Most of these infants had a benign clinical course [5].

Our patient is one of the youngest documented patients with accidental ingestion of formula mixed with alcohol with a very high alcohol level on presentation. Despite having a markedly elevated

blood alcohol level, this patient had a mild clinical course significant for tremulousness and weak cry on presentation, but did not exhibit any symptoms of hypothermia, hypoglycemia, or cardiorespiratory impairment. As his blood alcohol level started trending down, the patient became more alert and calm with resolution of his tremulousness. Given the age of the patient it was very difficult to assess mental status or complete a thorough neurologic examination.

Our case demonstrates that infants exposed to alcohol may lack typical or clear symptoms of acute intoxication. These symptoms are frequently seen in older children and adults where the blood alcohol level is directly related to the Glasgow Coma Scale [6], neurologic, and cardiorespiratory symptoms on presentation [7]. The diagnosis of alcohol ingestion can be challenging in an infant presenting with altered mental status. Most ingestion due to alcohol are unintentional and are revealed only after caregiver recalls it. These patients need to be rapidly assessed for altered level of consciousness, hypothermia, hypoglycemia, hypotension, bradycardia, respiratory insufficiency, seizures, and coma. Prompt management needs to be initiated with priority given to airway, breathing, and circulation. Close monitoring of blood glucose and blood alcohol levels is needed.

Ethanol is metabolized hepatically *via* 2 pathways: Alcohol Dehydrogenase (major, rate-limiting pathway) and Microsomal Ethanol-Oxidizing System (MEOS). In children <5 years old, metabolism is decreased due to immature alcohol dehydrogenase activity [8,9]. Alcohol follows zero-order elimination kinetics in adults, but infants may follow first-order elimination for alcohol [10]. The rate of alcohol elimination varies in the literature. One study found that the elimination rate of alcohol in children not previously exposed to alcohol was 14.3 to 21 mg/dl/hr [8], which is similar to the elimination rate in our patient. In adults, the ethanol clearance has been established at 15-20 mg/dl/hr [9].

Studies have shown that pre-exposure to alcohol during infancy will enhance the predisposition to ethanol intake during adolescence if they are under stress (i.e., parental deprivation, negligent parental care, and adverse socioeconomic conditions) [10]. There is only one follow up study in a 30 day old infant who ingested alcohol. He had periodic follow-up at 2, 3, 6, and 12 months, was evaluated for neuro-motor development using Bayley Scales of Infant Development II, and was reported to have normal psychomotor development [11]. There are no long-term follow up studies to assess the effects of alcohol on the infant brain.

Another challenging aspect of managing an infant with alcohol ingestion is the social aspect. Parents are often afraid to release information about alcohol ingestion due to fear of involvement of child protective services. Although most alcohol ingestions in infants and children are unintentional, managing these patients should be a multi-disciplinary approach with early involvement of social services to

ensure the future safety of the child. Notification of child protective services involves a home safety assessment and review of prior child welfare involvement [12].

## Conclusion

This is one of the youngest documented patients with accidental alcohol ingestion with a very high alcohol level on presentation. It is important to have a high level of suspicion for alcohol ingestion and a low threshold to order an ethanol level in an infant presenting to the ED with altered mental status, because as our case shows, there may be no hallmark abnormalities in the vital signs, electrolytes, or physical exam. It is important to remember that due to immature hepatic enzyme pathways, the elimination kinetics of alcohol is different in infants compared to adults. Due to the limited number of cases, long-term follow up studies regarding the neurodevelopmental abnormalities in these infants are lacking. Due to parental preference, our patient's family decided to follow up with their previously established pediatrician instead of at our academic institution.

## References

1. Sowell ER, Charness ME, Riley EP (2014) Pregnancy: No safe level of alcohol. *Nature* 513: 172.
2. Paley B, O'Connor MJ (2009) Intervention for individuals with fetal alcohol spectrum disorders: treatment approaches and case management. *Dev Disabil Res Rev* 15: 258-267.
3. Hoyme HE (2016) Updated Clinical Guidelines for Diagnosing Fetal Alcohol Spectrum Disorders. *Pediatrics* 138.
4. Jung YC, Namkoong K (2014) Alcohol: intoxication and poisoning - diagnosis and treatment. *Handb Clin Neurol* 125: 115-121.
5. Minera G, Robinson E (2014) Accidental acute alcohol intoxication in infants: review and case report. *J Emerg Med* 47: 524-526.
6. Weinberg L, Wyatt JP (2006) Children presenting to hospital with acute alcohol intoxication. *Emerg Med J* 23: 774-776.
7. Evans MA (1974) Quantitative relationship between blood alcohol concentration and psychomotor performance. *Clin Pharmacol Ther* 15: 253-260.
8. Brennan DF, Betzelos S, Reed R, Falk JL (1995) Ethanol elimination rates in an ED population. *Am J Emerg Med* 13: 276-280.
9. Edmunds SM, Ajizian SJ, Liguori A (2014) Acute obtundation in a 9-month-old patient: ethanol ingestion. *Pediatr Emerg Care* 30: 739-741.
10. Miranda-Morales RS, Haymal B, Pautassi RM (2016) Effects of ethanol exposure in a familiar or isolated context during infancy on ethanol intake during adolescence. *Dev Psychobiol* 58: 968-979.
11. Palano GM (2007) Accidental ethyl alcohol intoxication in a 30-day-old infant. Clinical findings and neurological follow-up. *Minerva Pediatr* 59: 275-279.
12. Wells K (2009) Substance abuse and child maltreatment. *Pediatr Clin North Am* 56: 345-362.