

#175: Double Liver Transplant Post Acetaminophen and Safflower Oil Ingestion in a Pediatric Patient

Breanna Pancioli¹ PharmD, CSPI, Sheila Goertemoeller¹ PharmD, DABAT, ICPS, Anna Borgemenke² PharmD, Shan Yin¹ MD, MPH; *Cincinnati Drug and Poison Information Center¹, Cincinnati Children's Liver Transplant Team²*



Background

- Acetaminophen overdose is the leading cause of acute liver injury with 1-3% of overdoses require liver transplantation
- Children younger than six have a lower risk due to:
 - smaller exploratory ingestions
 - immature CYP450 enzymes favoring sulfation
 - higher liver-to-body mass ratio
- Prior literature (Rivera-Penera et al., 1997) (Rumack, 1984) demonstrates acetaminophen related pediatric liver transplants are very rare in children <10 years old
 - discusses primarily repeated supra-therapeutic ingestions administered by parents for pain / fever / otitis media with delayed presentations requiring transplant
- Safflower oil is a supplement found in cooking oils, cosmetics, and weight-loss products
- Case reports have linked safflower oil to acute liver failure

Case Report

- A five-year-old female and her twin ingested an unknown quantity of adult-formulation acetaminophen of unspecified strength while supposed to be napping
- Over next two days the patient developed vomiting and chills
- Family suspected viral illness, managed with a home remedy cocoa drink mixed with diphenhydramine, antacids, and a Jaloma Mexican sweet oil topical product



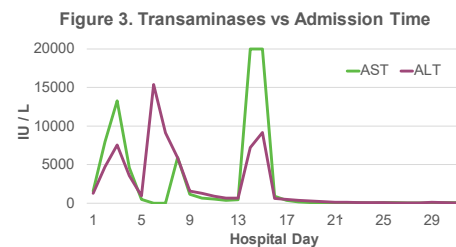
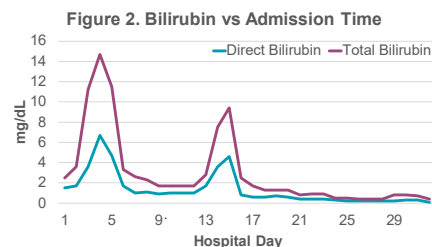
Figure 1. Jaloma Sweet Oil

Case Report (continued)

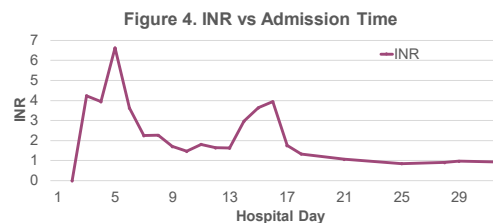
- Continued worsening two days post exposure prompted ED visit with persistent gastrointestinal symptoms, jaundice, hypoglycemia
- Found to be in acute liver failure with an acetaminophen level of 110 mcg/mL more than 24 hours post ingestion

Table 1. Acetaminophen Level Trend			
Time	HD 1 (>24 H post ingestion)	HD 2	HD 3
Acetaminophen Level (mcg / mL)	110	AM: 78 PM: 24	5

- Got one dose of fomepizole and double maintenance rate N-acetylcysteine regimen which ran continuously for two days
- Deteriorating labs (peak AST >20,000 IU/L, peak ALT 15,403 IU/L, total bilirubin 14.7 mg/dL) prompted treatment with vitamin K, blood products, dextrose, plasmapheresis and molecular adsorbents recirculating system therapy (MARS)



- Workup for medical causes and infectious etiologies including hepatitis were negative
- Progression to encephalopathy, cerebral edema, and increased intracranial pressure by hospital day (HD) 3 accompanied by worsening coagulopathy (INR 6.63)
- On HD 5 got transplanted partial liver from a deceased donor, with revision surgery for hepatic artery kinking HD 6
- Postoperative treatment: continuous renal replacement therapy (CRRT), standard immunosuppression, and infection prophylaxis
- Complication on HD 13 of hepatic artery thrombosis (HAT) and primary graft dysfunction leading to hyperbilirubinemia, hyperammonemia, and recurrent transaminitis and coagulopathy
- HAT accompanied by septic shock (enterococcal bacteremia and cytomegalovirus) led to a second whole organ liver transplant (HD 15)
- Following re-transplantation, the patient got intermittent hemodialysis and supportive care, but overall recovered quickly
- Hospitalization duration was 55-days
- Twin initially had gastrointestinal symptoms, got maintenance infusion of NAC, met discontinuation criteria, and was discharged home



Discussion

- Five-year-old patient received two consecutive liver transplants following:
 - unintentional ingestion of acetaminophen
 - provided safflower oil containing home remedy
- Few if any case reports exist of unintentional pediatric acute acetaminophen overdose resulting in liver transplant
- Given patient's acetaminophen level, liver function, and clinical presentation acetaminophen is likely the primary cause of ALF
 - safflower oil may have been contributory
- Limitations of this case report:
 - conflicts in initial history between providers regarding acetaminophen usage prior to the exposure
 - language barrier with family

Conclusion

- Even unintentional acetaminophen overdoses can result in hepatotoxicity and need for liver transplantation in a pediatric patient
- Safflower oil remedies may contribute to hepatotoxicity

References

- De Ataide EC, Reges Perales S, de Oliveira Peres MA, Bastos Eloy da Costa L, Quarella F, Valerini FG, Chueiri Neto F, Silveira Bello Stucchi R, de Fátima Santana Ferreira Boin I. Acute Liver Failure Induced by Carthamus tinctorius Oil: Case Reports and Literature Review. *Transplant Proc.* 2018 Mar;50(2):476-477. doi: 10.1016/j.transproceed.2018.01.010. PMID: 29579631.
- Ogilvie J, Rieder M, Lim R. Acetaminophen overdose in children. *CMAJ.* 2012, Sept; 184 (13):1492-1496; DOI: 10.1503/cmaj.111338
- Rivera-Penera T, Gugli R, Davis J, McDiarmid S, Vargas J, Rosenthal P, Berquist W, Heyman MB, Ament ME. Outcome of acetaminophen overdose in pediatric patients and factors contributing to hepatotoxicity. *J Pediatr.* 1997 Feb;130(2):300-4. doi: 10.1016/s0022-3476(97)70359-7. PMID: 9042136.
- Rumack BH. Acetaminophen overdose in young children. Treatment and effects of alcohol and other additional ingestants in 417 cases. *Am J Dis Child.* 1984 May;138(5):428-33. doi: 10.1001/archpedi.1984.02140430006003. PMID: 6711498.