

## Coopper sulfate poisoning

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**Received date:** October 19, 2024; **Accepted date:** November 06, 2024; **Published date:** December 09, 2024

**Citation:** Yasemin Geben, Anıl İflazoğlu, Ali Karakuş, (2024), Coopper sulfate poisoning, *Clinical Research and Clinical Trials*, 11(3); DOI:10.31579/2693-4779/241

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### Abstract:

CuSO<sub>4</sub> (Copper Sulfate) is a blue colored substance that is easily accessible, used in agriculture, leather industry, glue production at home, and as a fungicide in farming. Since it is frequently used in farming, acute and chronic exposure can occur. We wanted to remind the emergency approach to Copper Sulfate poisoning with this case report.

**Keywords:** copper sulfate; emergency department; case management

### Introduction

Copper is a trace element found in high concentrations in the brain, kidney and liver and carried by ceruloplasmin in the blood. While 50% of copper is excreted through bile, most of the rest is excreted through other gastrointestinal secretions. Therefore, the GIS is the main regulator of copper metabolism.

### Case

A 35-year-old female patient was brought to the emergency department with complaints of severe nausea and vomiting that started after drinking about half a tea glass of agricultural pesticide containing copper sulfate. The patient's vital signs were stable, her neurological examination was normal, lung sounds were normal, abdominal examination was comfortable, and no bleeding was detected in her rectal examination. The patient's tests were performed, symptomatic treatment and hydration were started. In blood gases; metHb value was measured at 4-hour intervals, respectively; % 1.8, 2.2, 2.7, 3.3, Lactate value, 2.3, 1.3, 0.9, 0.5mmol/L, hemoglobin values; 13.4, 11.3, 10.2, 9.5 g/dL were measured, BFT, LFT values were normal in the follow-ups, 24-hour AFT follow-up was normal. The patient was followed up in the emergency room for 24 hours, IV hydration, 2\*4mg ondansetron, 1\*2mg pantoprazole were given during the follow-up, the patient who had no symptoms at the end of 24 hours and whose vitals were stable was called for check-up every other day. In the first check-up, metHb: 3.5%, Hb: 11g/dL, vitals were stable, and there were no symptoms.

### Discussion

While the daily copper requirement of an adult is 1-100 mg, intake of more than 1 g indicates toxicity symptoms. Ingestion of more than 10-20 g is lethal. The most common side effects in acute high-dose oral intake are gastrointestinal effects such as abdominal pain, hematemesis, melena, diarrhea, jaundice, dehydration, and loss of appetite. Green-blue color in vomit and stool are findings that suggest copper toxicity. Headache, tachycardia, altered consciousness, and even coma may accompany GI findings. Fatigue, irritability, depression, and psychiatric symptoms such as difficulty concentrating may also be observed. In severe copper poisoning,

rhabdomyolysis, cardiac and renal failure, intravascular hemolysis, methemoglobinemia, hepatic necrosis, encephalopathy, and ultimately death may occur. In cases where copper intoxication is suspected, urine and blood copper levels, serum ceruloplasmin values, hemolysis tests, BFT, and KCFT measurements should be checked. Intravascular hemolysis can occur within 24 hours after oral intake, can be rapid and severe, and should be closely monitored in this regard. During hemolytic crisis, Methemoglobinemia, low Hb and glutathione values are seen. Copper toxicity should be managed according to 4 main principles; reduction of absorption, close observation, supportive treatment and chelation. Zinc in pharmacological doses in the early stage may delay the onset of symptomatic disease because Zinc competes with copper during absorption from the GIS. Chelation therapy aims to remove copper taken into the body from the body. In severe cases, plasmapheresis, exchange transfusion and dialysis may be required. Although dialysis is ineffective for copper removal in patients with ARF, it is necessary to maintain life. Hemolysis should be closely monitored, and methemoglobin should be monitored in patients with cyanosis. ES replacement should be performed in patients with severe hemolysis, and Methylene Blue should be given to patients with severe methemoglobinemia who develop cyanosis. Methylene blue is contraindicated in patients with G6PD deficiency.

### Conclusion

Copper sulfate toxicity is a serious toxicity that is not very common in the clinic but can cause complications such as severe GI symptoms, hemolysis, methemoglobinemia, renal and hepatic failure, and even death. Therefore, its recognition and rapid management in the emergency department are very important.

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DOI:10.31579/2693-4779/241

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