

# Auramine-o and Malachite Green Poisoning: Study of Clinical Profile

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## Abstract

The use of cow dung among south Indians, especially in the villages to clean the premises and living areas is well known since ages. Now a days, since people find it difficult to easily flock natural cow dung, synthetic cow dung powders possessing germicidal properties have come into role. These synthetic dyes are available readily in two colors: yellow (auramine) and green (malachite). Despite the fact that these synthetic powders are legally banned because of the toxic effects, they are yet easily available in the grocery stores. The consumption of synthetic cow dung powders with a suicidal intention among the south Indian adults especially in the districts of Coimbatore, Tirupur and Erode is gradually increasing in recent times along with a concurrent increase in accidental consumption of these powders among the pediatric population. And there are no specific treatment plan or prescribed antidote available for the management of synthetic cow dung powder poisoning. A very few cases have been reported with synthetic yellow cow dung powder poisoning and no cases have been reported with malachite. We have reported two cases with the history of accidental consumption of the toxin in this case series.

Keywords: Auramine, Malachite, Synthetic cow dung powder

## Introduction

The use of cow dung (possessing germicidal activity) among Indians, especially in South Indian villages to clean living premises is well known<sup>1,2</sup>. Since natural cow dung is not handily available, people now a days use synthetic cow dung powder. These powders are commonly used as a suicidal poison in the districts of Coimbatore, Tirupur and Erode <sup>1</sup>. Even though the sale of synthetic cow dung powders is legally banned, it is reported to be easily available in markets and grocery shops in two colors; yellow (auramine-o; chemical constituent: Diaryl Methane dye) and green (malachite green; chemical constituent: Triphenyl methane). There are no specific antidotes available for these dyes <sup>2</sup>.

Acute exposure to the catatonic dye auramine initially reflects in neurological features like convulsions, focal deficits and coma, and the direct effects of the toxin in the CNS becomes clearly evident with the decreased Glasgow Coma Scale score in the patients with the history of consumption of synthetic yellow cow dung powder. Sudden onset of seizures reflects the direct involvement of cerebral hemisphere brain region. The synthetic powder possessing hepatotoxic properties is known to cause severe liver damage as a result of centrilobular necrosis which is mostly considered to be dose related of the toxic metabolite. The damage progresses from the middle lobe of the liver, resulting in mild necrosis due to parenchymal damage and asymptomatic transaminitis followed by severe necrosis accompanied by jaundice. The dye also being a GI

irritant, damages the GI mucosa causing epigastric pain and discomfort. It is also reported to cause severe ocular injury, conjunctival edema and purulent discharge on direct exposure to the eye. *In vivo* studies revealed the oral LD<sub>50</sub> of 150-1500mg/kg and *in vitro* study has also confirmed DNA damage in human cell lines<sup>3</sup>. Case reports also revealed that the patients also developed tachycardia, metabolic acidosis and hyperglycemia over a short period of time, which was not reported in previous literatures<sup>1</sup>.

Malachite green is traditionally used as a dye and as parasiticide in fisheries. Malachite green is a reported multi-organ toxin and generally results in delayed effects, and there are no case reports, human toxicological or experimental studies available. Chemical safety data performed in suitable animal models determined the acute oral LD<sub>50</sub> of 80-120mg/kg<sup>4</sup>. Rodents fed with this synthetic toxin (leucomalachite green) were presented with delayed and dose dependent liver damage, hepatic tumors and lung adenomas<sup>5</sup>,

### Case report: 1

A 13-year-old-female was admitted to Intensive Care Unit at a secondary healthcare hospital for chief complaints of breathlessness due to consumption of synthetic yellow cow dung powder. On examination, the patient was conscious, oriented and other vitals were found to be normal. Laboratory Investigations such as Complete Blood Count (CBC), Liver Function Test (LFT), Renal Function Test (RFT), were also found to be normal except for her Random Blood Glucose (54mg/dl). Prior to her admission in the ICU, stomach wash was performed in a government primary healthcare center and the patient was referred to secondary healthcare hospital for further management. Intravenous fluids; Ringer Lactate (RL), Normal Saline (NS) and Dextrose Normal Saline (DNS) and injection ranitidine were administered on the time of admission and the patient was closely monitored for development of any delayed toxic effects of the synthetic cow dung powder. Yellow discoloration of the skin was not evident in this patient and the liver and renal functions were found to be normal on the second day. On the third day injection midazolam was prescribed and was advised only to be administered if the patient develops any seizure or convulsions. On Day 4, the patient was discharged without any complications and complaints.

**Table 1: Laboratory parameters of the patient**

Laboratory Parameters	Obtained Value	Normal Value
<i>COMPLETE BLOOD COUNT</i>		
Hemoglobin	13.1 g/dL	12-16 g/dL
White Blood Cell Count	9.6*10 <sup>3</sup> cells/mm <sup>3</sup>	3.2-9.8*10 <sup>3</sup> cells/mm <sup>3</sup>
Polymorphs	60%	54 -62 %
Lymphocytes	27%	25 -33 %

Monocytes	6%	3 - 7%
Platelet Count	192*10 <sup>3</sup> cells/mm <sup>3</sup>	130 - 400*10 <sup>3</sup> cells/mm <sup>3</sup>
Red Blood Cell	4.3*10 <sup>6</sup> cells/mm <sup>3</sup>	3.5 - 5.0*10 <sup>6</sup> cells/mm <sup>3</sup>
Hematocrit	35.4%	33 - 43 %
Mean Cell Volume	81.2μm <sup>3</sup>	76 - 100μm <sup>3</sup>
Mean Cell Hemoglobin	30 pg /cell	27 - 33 pg/cell
Mean Cell Hemoglobin Concentration	37 g /dL	33-37 g/dL
<i>BLOOD GLUCOSE</i>		
Random Blood Sugar	54 mg/dL	<200 mg/dL
<i>RENAL FUNCTION</i>		
Blood Urea	24 mg/dL	20 - 40 mg/dL
Serum Creatinine	1 mg/dL	0.6 - 1.2 mg/dL
<i>LIVER FUNCTION</i>		
Aspartate Aminotransferase	10 U/L	0 - 35 U/L
Alanine Aminotransferase	8 U/L	0 - 35 U/L
Alkaline Phosphatase	57 U/L	30-120 U/L
Total Bilirubin	0.4 mg/dL	0.1 - 1 mg/dL
Direct Bilirubin	0.1 mg/dL	0 - 0.2 mg/dL
Indirect Bilirubin	0.3 mg/dL	0.1 - 0.8 mg/dL

**Case report: 2**

A 10-year-old male patient patient was admitted to pediatric ICU in a secondary healthcare hospital with the chief complaint of accidental ingestion of synthetic cow dung powder. The patient had no history of vomiting and episodic stomach pain. On examination, the vital parameters and laboratory investigation reports were found to be normal except for the urine analysis, where urine pus cells deposits and epithelial pus cells levels were elevated from the normal range. On admission, gastric lavage was performed following which intravenous fluids Normal Saline and Ringer lactate were administered along with injection Ranitidine to the patient and was closely monitored for any delayed effects of the toxins like yellow discoloration if the skin and distorted liver function. The patient's caretakers were advised to keep the patient Nil Per Oral (NPO) for 2 days. On day 2, the patient had no specific complaints and there was no history of vomiting, loose stools or abdominal distress. On the 3<sup>rd</sup>

day of admission, oral feeds were initiated and the patient was monitored closely for any gastric symptoms. As the patient did not show any vital symptoms of the synthetic toxin, the patient was advised to get discharged and was asked to present to the OPD after 2 weeks, and to report immediately if yellow discoloration of the skin is observed.

### **Discussion**

The use of synthetic cow dung powder in recent days has emerged to be more common among the people of South India especially in the districts of Coimbatore, Tirupur, Erode and Nilgiris. Several cases of accidental consumption of synthetic cow dung powder among the pediatric population is also being reported to increase gradually. Synthetic cow dung powder is easily available in two colors; yellow (auramine-o) and green (malachite) and is very well known to result in moderate to severe hepatotoxicity, CNS depression, seizures, focal deficits, coma and death. There are no specific antidotes available for the treatment of synthetic cow dung poisoning, which makes the situation even more challenging when the patient does not respond properly to the treatment.

Oral intake of the toxin is reported to be majorly excreted through urine, which results in precipitation of the toxin in the kidneys and results in severe kidney injury. A study hypothesized the use of Sodium Bicarbonate, which minimized the absorption of the toxin to the tissues and also promoted the elimination of the toxin. But more such studies are needed to estimate the dose and other pharmacokinetic properties of sodium bicarbonate in the use of synthetic cow dung poisoning.

### **Conclusion**

Studies involving more patients must be conducted to well establish the toxicokinetic properties of the synthetic toxin and to come up with an appropriate antidote and a standard treatment protocol.

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### **Conflicts of interest**

The authors declare that there is no conflict of interest.

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