Anti-oxidant therapy in management of acute naphthalene ball poisoning

Dear Editor,

Naphthalene, a bicyclic aromatic hydrocarbon, is often used in moth balls as a de-odorizer and moth repellent. One mothball has been shown to contain approximately 0.5–5 g of naphthalene. The lethal dose of naphthalene in adults is 5–15 grams.[1] Naphthalene is metabolized in the liver. The toxic effect of naphthalene is because of an increased production of free oxygen radicals. This leads to cellular damage especially of red blood cells, resulting in oxidation of hemoglobin, formation of methemoglobin, and acute intra-vascular hemolysis.[1]

A 22-year-old male with no known co-morbidities was brought into the emergency department (ED) by his parents,

Table 1: Management Algorithm for Acute Naphthalene Toxicity

Toxidrome and workup	Nausea, vomiting, pain in the abdomen, confusion, fasciculation, seizures, congestion, acute respiratory distress syndrome, icterus, transaminitis, optic nerve atrophy, acute kidney injury, and coma. Life-threatening complications – intra-vascular hemolysis. -Frequent clinical and hematological monitoring is imperative -Urine analysis for 1,2-dihydroxynaphthalene (not freely available)
Treatment	No antidote available. Treatment is largely symptomatic/supportive. Naphthalene and its metabolites are not dialyzable. Methylene blue, exchange transfusion (in the case of G6PD deficiency) may be indicated in the case of intra-vascular hemolysis.

30–35 minutes after he had accidently consumed four moth balls at his home. On presentation in ED, he was conscious, responsive, afebrile, euglycemic, and hemodynamically stable. He had the characteristic odor of moth balls in his breath. He complained of nausea and heaviness in the abdomen. Intravenous access was established, labs were drawn, and the patient was started on maintenance intravenous normal saline. Gastric lavage was performed in ED. Methemoglobin (Met Hb) levels were not increased (1.3%). The patient was further managed in an intensive care unit (ICU). To prevent the well-known toxic oxidative stress induced by naphthalene, he was started on parenteral anti-oxidants, ascorbic acid (Vitamin C) 500 mg twice a day, and N-acetyl cysteine (NAC) 1 gm twice a day.

His initial laboratory values and electrocardiogram were all normal. The hemolysis workup performed after 48 hours of admission was negative. He was observed closely in ICU for any evidence of naphthalene toxicity. He was discharged on hospital day 4 after psychological counseling and necessary information.

Naphthalene is an oxidant and promotes production of oxygen free radicals, leading to de-oxyribonucleic acid damage and lipid peroxidation. Naphthalene toxicity may present with varied clinical manifestations [Table 1].[2] Vitamin C and NAC have been proved to be potent scavengers of oxidizing free radicals in the biological system. Vitamin C is one of the first lines of anti-oxidant defense, protecting lipid membranes and proteins from oxidative damage.[3] NAC stimulates glutathione biosynthesis, promotes de-toxification, and acts as direct free-radical scavenger.[4] Toxicity has been reported even after consumption of one moth ball.[5] Consistent observation was made in most of the cases and case series, which indicated concealing naphthalene ingestion history and delay between ingestion and the onset of serious signs and symptoms. Response to anti-oxidants has been shown to be inconsistent in different studies of naphthalene poisoning, perhaps because of late initiation.[5] We believe that early initiation of anti-oxidants in our patient must have intensified and replenished the body's scavenging defense system before it would get exhausted and prevented any toxic manifestation of ingested naphthalene.

No antidote or specific treatment is available for naphthalene toxicity, and the treatment is mainly symptomatic.[2] Its overdose can lead to life-threatening complications, especially when the patient presents late or has consumed a large quantity. However, when presented early, anti-oxidants can be used safely as a potential treatment option to prevent complications and improve outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Quick Response Code:

Website: https://journals.lww.com/joacp

DOI: 10.4103/joacp.joacp_122_22

How to cite this article: Goel A. Anti-oxidant therapy in management of acute naphthalene ball poisoning. J Anaesthesiol Clin Pharmacol 2024;40:357-9.

Submitted: 29-Mar-2022 **Revised:** 14-Jun-2022
Accepted: 15-Jun-2022 **Published:** 08-Apr-2024