

## Fulminant Oxalic acid Poisoning- A Case Report

Chidananda P.S<sup>1</sup>, Shefali Navamani<sup>2</sup>

### Abstract

Oxalic acid poisoning is one of the rare cases encountered. Acute toxicity after ingestion of fatal dose of these compounds poses difficulties in treatment. Here we report a case of death due to ingestion of oxalic acid in an elderly female. At autopsy, Upper Gastro-intestinal Mucosa was marshmallow white-bleached, corrugated and showed haemorrhagic spots. Small intestine was intensely congested, friable at places and their lumen was similarly corrugated and marshmallow white bleached. Self-poisoning due to consumption of various compounds are on the rise in India. Oxalic acid poisoning being a rare case, presence of classical signs at autopsy, will be beneficial to suspect its poisoning.

**Keywords:** Oxalic acid; Marshmallow Bleaching; Tubular necrosis; Hypocalcaemia

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### Introduction:

Oxalate ions of oxalic acid have two electron pairs on each of the negative oxygen atoms that readily attack from two sides on to any metal ion that comes in its way. Due to this structure, more oxalate ions will follow, surrounding the metal with two, three or four oxalate ions depending on its size. This effect can be used to remove unwanted iron compounds, especially rust from kitchenware and even marble. As scavengers, oxalic acid or oxalates are components in many technical cleaning formulations and these solutions all work on the assumption that the metal-oxalate compounds formed are water-soluble and thus can easily be washed away. Hence, are used as a disinfectant, household bleach, metal polish, antirust products, furniture refinisher, in photographic, ceramic rubber, leather and many other manufacturing<sup>1, 2</sup>. Due to the easy availability of these

compounds, it may be used for suicidal purposes, or ingested accidentally, owing to its colourless and odourless nature.

### Case report:

A 70-year-old elderly female was found unconscious at her residence. A plastic bottle which was said to contain Oxalic acid was present beside her. Lungs were congested and oedematous. Peritoneum contained 250ml of brown tinged fluid. Surface of the liver had mottled appearance. Stomach contained mucous tinged fluid. Mucosa was bleached, corrugated and showed haemorrhagic spots. Pungent odour was emanating. Mucosa of oesophagus, stomach and duodenum were corrugated, bleached and marshmallow white coloured as is shown in Figure.No:1. Small intestine was intensely congested, friable at places and their lumen was similarly corrugated and marshmallow white-bleached as is shown in Figure No: 2. The chemical analysis result came out to be positive for oxalic acid, in all the viscera sent.

### Discussion:

Oxalic acid is one of the strongest acids among the carboxylic acids found in living

<sup>1</sup>Associate Professor, <sup>2</sup>Postgraduate, Department of Forensic Medicine and Toxicology, Shimoga Institute of Medical Sciences, Shivamogga.

**Correspondence:** Dr. Shefali Navamani

Email id- [navamanishefali@gmail.com](mailto:navamanishefali@gmail.com)

Contact no- +919367330000

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organisms. They can be ingested accidentally or suicidally. Accidentally these salts can be mistaken to be, magnesium sulphate also called as Epsom salt or zinc sulphate<sup>3</sup>. Oxalic acid poisoning epidemic was reported in Sri Lanka after self-poisoning due to a laundry packet<sup>4</sup>. A case study reported ingestion of washing detergent by 115 people which contained sachets of oxalic acid and potassium permanganate separately. People who ingested oxalic acid and the combination of both, died, whereas people who ingested potassium permanganate alone survived. The rapid fatality from the time of ingestion to the death was opined to be due to cardiac failure from hypocalcaemia which in turn was because of formation of calcium oxalate complexes<sup>5</sup>. These salts are also found naturally in dark-green leafy vegetables like beet leaves, purslane, spinach, rhubarb and parsley<sup>6</sup>. They have direct corrosive effect on skin and mucosa and once absorbed, they react with calcium in the plasma to form insoluble calcium oxalate producing hypocalcemia<sup>7</sup>. Renal tubular epithelial necrosis, with the proximal convoluted tubule affected the most, is produced by precipitation of calcium oxalate stones<sup>8</sup>. The pathophysiological factors, at the cellular level in the kidneys include, energy depletion, cell swelling, calcium influx, intracellular acidosis and enzyme activation<sup>9</sup>. Acute exposure resulting in profound hypocalcaemia and severe mucosal irritation can cause rapid death. The severe gastroenteritis and the shock produce a fatal outcome resulting in death even before therapy<sup>10</sup>. It has sour and slightly bitter acidic taste. Oral lethal dose is said to be 15-30 g, but in few cases death is reported to be as little as 5 g<sup>11</sup>. Our literature search did not find any reporting of marshmallow whitening/bleaching of mucosa of upper GI tract in Oxalic acid ingestion. There can be two possible explanations to this<sup>12</sup>. The first hypothesis was that there is elevation of plasma oxalic acid level which in turn shows an increase in calcium oxalate ion product.

Since these products are sparingly soluble in aqueous solutions at physiological pH, it would be expected to precipitate in the tissues. The second hypothesis mentioned was, the oxalic acid may be deposited as a non-crystalline complex of calcium oxalate and lipid, in the liver and intestine<sup>12</sup>. Oxalates are colourless, odourless, transparent compounds and hence an unlabelled oxalic acid solution can be of a threat<sup>3</sup>.

### Conclusion:

Mortality and morbidity due to various poisons are on the increase. Consumption of oxalic acid accidentally or suicidally is known to have occurred throughout India. Marshmallow whitening of the Gastro-intestinal mucosa should point towards Oxalic acid contact. Early treatment measures will prove beneficial in preventing the fatal outcome (Shock, severe gastroenteritis, acute tubular necrosis).

**Conflict of Interest:** None.

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