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Case Report
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Slim to Kill: 2,4-Dinitrophenol (DNP), The Naïve Assassin!

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Abstract

2,4-Dinitrophenol (DNP) is known to cause rapid weight loss by "fat burning". Despite this drug not being available over the counter, there is an underground supply mostly over the internet. We report the case of a 22-year-old healthy female who had rapid demise after ingestion of only two tablets of DNP. She was previously healthy, developed symptoms in five hours and succumbed within thirty minutes of admission. Since 1918, 1919 published deaths have been reported from developed countries. To the best of our knowledge, this is the first reported fatal case from a developing country.

Introduction

The demand for weight loss medications is on the rise globally due to the obesity pandemic. Drugs which are not formally FDA approved may still be unfortunately procured via the internet [1]. In 1933, at Stanford University, Maurice Tainter discovered DNP and its use as a weight loss agent [2]. DNP increases the basal metabolic rate by burning carbohydrates and fats leading to the much-desired rapid weight loss. As reports of dangerous side effects like cataract and even death emerged, in 1938, DNP was labeled "not fit for human consumption "[2]. The first death due to DNP was in 1918 due to occupational exposure [2]. In 1981, a US based physician faced legal action including imprisonment for marketing DNP as a weight loss agent under the name of "Mitcal" [2]. It has a narrow therapeutic index and is extremely dangerous in overdose [1]. DNP has been banned in UK and US and it has been labeled as a hazardous drug under Clean Air Act [2]. Despite all these warnings, deaths due to DNP are still being reported. We report a case of rapid demise of a healthy 22-year-old female following ingestion of only two tablets of DNP.

Case Presentation

A 22-year-old female, trained classical dancer, consumed two tablets of 2,4-dinitrophenol in the afternoon on the advice of a "gym buddy" for weight loss. Five hours later she started complaining of fatigue, diaphoresis and myalgia followed by two episodes of vomiting. There was no significant past history of cardiovascular or respiratory illness. She was referred from a local private hospital to our center the same night about seven hours after the ingestion. At our center, on presentation, the patient was conscious and oriented and she admitted to consuming the tablets. On examination, her pulse rate was 130 beats/min with a systolic blood pressure of 70 mmHg and respiratory rate of 34 breaths/min. She had high grade fever (104F) with profuse sweating and she appeared cyanosed. Systemic examination was within normal limits. Chest roentgenogram was normal. Electrocardiogram showed sinus tachycardia. She was started on supplemental oxygen therapy at 8L to 10 L/min by non-rebreather mask. Patient was given a nasogastric lavage with saline followed by activated charcoal instillation through the Ryle's tube. Patient was shifted to intensive care unit. A central line was inserted and central venous pressure was measured at 4 cm to 6 cm of H_2O. Appropriate intravenous fluid resuscitation was initiated followed by inotropes. The patient needed endotracheal intubation with mechanical ventilation with a FiO_2 of 100%. Despite adequate resuscitation, the patient relentlessly deteriorated and eventually succumbed within 30 min of presentation. Immediately after death, the body became stiff and rigid within 10 min. A medico-legal case being already registered, the body was sent for post mortem. The kidneys on histopathology showed cloudy degeneration with maintained corticomedullary differentiation (Figure 1). The lungs showed pulmonary edema with the alveolar interstitial septa showing congested vessels (Figure 2). Histopathology of the heart was unremarkable.

Discussion

DNP is marketed illegally over the internet as a weight loss agent [1-3]. It is available as a yellow

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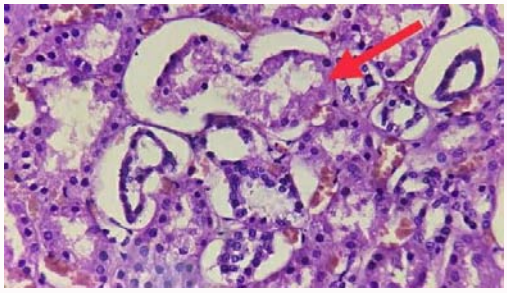

Figure 1: Histopathology of kidney (Haematoxylin and Eosin (H&E) stain-40x) - Renal tubular epithelium showing cloudy swelling and hydropic degeneration (arrow).

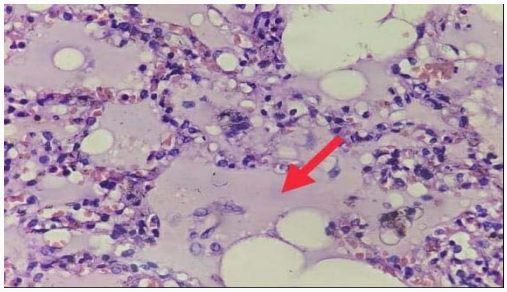

Figure 2: Histopathology of lung (H&E-40x) Lung alveoli are filled with pink homogenous fluid (arrow) with dilatation of capillary bed suggestive of pulmonary oedema.

crystalline powder or in tablet form [1]. A typical regime is to start it at a low dose and then titrate it to a high dose taken for total period of two weeks. It acts by uncoupling of oxidative phosphorylation and causes hyperthermia in the process similar to cyanide poisoning [1]. The most serious adverse event is death. In review of literature since 2001, 20 deaths have been reported. Of these, in 13 cases it was used for weight loss; in 7 cases it was used with suicidal intent [1]. Most common side effect reported is severe exfoliative dermatitis [2]. Others include gastroenteritis, anorexia, renal failure, pancytopenia, confusion, agitation, coma, and convulsion [1,4]. The average time of presentation is 8 h and average time of death is 14 h from consumption [2,3]. Our patient developed symptoms within five hours and succumbed within eight hours of ingestion. The earliest complaint is diaphoresis followed by tachypnea, tachycardia and heart failure as was evident in our patient. There have been few reports of early rigor mortis as seen in our patient. The release of calcium from the cytosol secondary to depleted adenosine triphosphate is the cause of the same [1,2]. There is no specific antidote and outcome depends on early recognition. The treatment is mainly supportive in the form of activated charcoal wash, aggressive fluid therapy, anti-seizure measures, benzodiazepines as sedatives, rapid cooling, inotropes and early intubation [4,3]. Antidotes used in cyanide poisoning like sodium thiosulfate, nitrates and hydroxocobalamin have not been mentioned in the reviews of treatment of DNP poisoning [1].

Conclusion

What actually decides the fatality in an individual consuming DNP is a million-dollar question. The innocent consumption of two tablets of 2,4-DNP on a friendly advice resulted in the death of our 22-year-old healthy patient. Our patient did not have any evidence of premorbid conditions like muscle enzyme deficiency, cardiovascular or respiratory illness. The rapidity with which deaths due to DNP occur makes it mandatory to put in place stringent measures to stop the illegal sale of this banned drug *via* the internet. Wide publicity as regards the fatal consequences of 2,4-DNP (however innocently consumed) is the need of the hour. The patient "gym buddy" now faces a harsh legal action.

References

1. ATSDR. Toxicological profile for Dinitrophenols. 2019.
2. Grundlingh J, Dargan PI, El-Zanfaly M, Wood DM. 2,4-Dinitrophenol (DNP): A weight loss agent with significant acute toxicity and risk of death. J Med Toxicol. 2011;7(3):205-12.
3. Zewari A, Ali A, O'Donnell A, Butt MS. Weight loss and 2,4-dinitrophenol poisoning. Br J Anaesth. 2009;102(4):566-7.
4. Lu YQ, Jiang JK, Huang WD. Clinical features and treatment in patients with acute 2,4-dinitrophenol poisoning. J Zhejiang Univ Sci B. 2011;12(3):189-92.