

Case Report

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Crisis averted an unusual presentation of hair dye poisoning: A case report

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Abstract

Background: Suicide is a growing public health and economic problem and the number of hair dye poisoning has nowadays been emerging as one of the predominant causes of self-harm especially in developing countries due to their easy availability and low cost despite this growing trend observed the amount of clinical knowledge regarding the clinical manifestation, treatment, and prognosis is still vague, especially in the rural part of developing countries where pesticide poisonings are still dominant. The exact composition of hair dye is not defined exactly as it varies greatly depending on the brand and country of origin hence the clinical manifestation also varies greatly.

Case presentation: Here I report a case of suicidal consumption of hair dye by a 36-year-old male of Tamil Nadu from the southern part of India and the protocol followed to prevent deterioration of the patient enabling a better outcome in the long run.

Conclusion: I conclude that this article supports the notion of preventive therapy rather than symptomatic therapy as hair dye poisoning is a field less explored especially in rural regions.

Keywords: Hair dye poisoning; Toxicology; Forced alkaline diuresis; Emergency medicine; Internal medicine.

Introduction

Suicide is a preventable public health problem but its ever-growing trend has been posing a great threat to the public and it also affects the respective family's mental and economic state. It's been accounted that there are more than 700,000 suicidal deaths every year and for every single suicidal death there are more than 20 more suicidal attempts [1] and it's one of the leading causes of death between the age groups of 15-44, women being more vulnerable to suicides than men [2]. Pesticides are the poison of choice in developing countries but recently there has been a change in this trend with the increase in the number of hair dye poisonings especially in rural India. The use of henna containing hair dyes has been dated back before 5000 years BC. The first synthetic hair dye was manufactured in a laboratory around 1856 and has been used commercially for over 100 years. Predominantly used in the African and Indian subconti-

ment [3,4]. The PPD present in the hair dye reduces the amount of darkening agent required hence reducing the production cost and increasing the profit margin as well as its toxicity. With an intrinsic desire to improve our outer appearance hair dye is a hot commodity consumed by millions regularly unlike developed countries where there is a strict regulation over its preparation - a maximum of 2% of PPD (Paraphenylenediamine) there is no such strict regulations in India [3,4]. In India, hair dyes are made by an amalgam of compounds each contributing to its toxicity, and since no antidote is present to combat its effects [3] the severity of clinical manifestation and the patient's progress mainly depends on two factors- the amount of hair dye consumed [1] and the duration between consumption and seeking medical aid. Here we describe the case of a 36-year-old male who was brought to the emergency department after consumption of hair dye super vasmol 33.

Case presentation

A 36-year-old male, of Tamil Nadu from the southern part of India working as a daily wage laborer with no significant medical history was brought to the casualty with an alleged history of consumption of hair dye Super Vasmol 33 presented with the chief complaint of vomiting. The patient was rushed to the hospital within 30 minutes by his relatives. On arrival, the patient was conscious, ill-looking, not dyspneic, and not tachypneic.

Investigation: Vitals were stable- blood pressure: 120/80 mmhg, pulse rate: 88/min, oxygen saturation- 98% under room air. All his laboratory findings especially his RFT (Table 1) and urine output were under normal limits.

Treatment: The patient was initially given gastric lavage and was later shifted to the Intensive Care Unit (ICU) for 24 hours for close monitoring. In the ICU the patient's urine output and saturation level were strictly monitored and was in NPO (Nil Per Oral) for 24 hours. For the first 24 hours Renal Function Test (RFT) was taken every 4 hours and was later taken on each day to monitor his serum creatinine levels. The patient was started with the treatment of INJ.ondansetron 8 mg iv bd, INJ. Pantoprazole 40 mg iv od for the first two days along with forced alkaline diuresis as a preventive measure.

Table 1: The RFT remained the same throughout the hospital stay.

RFT (Renal Function Test)	Test value	Reference range
Serum urea	20 mg/dl	15-40 mg/dl
Serum creatinine	1.0 mg/dl	0.7-1.4 mg/dl

500 ml of 0.9% normal saline over one hour followed by 400 ml of 5% dextrose with 100 ml of NaHCO₃ over one hour followed finally by 500 ml of 0.9% normal saline with 10 mEq of KCL over one hour.

Outcome: Totally 6 cycles were given and the patient was advised to take plenty of oral fluids throughout his hospital stay. The patient was shifted to the general ward from the ICU after 24 hours once the RFT and urine output were within normal limits. Advised to resume oral feeds after a day from hospital admission. By day 7 the patient was discharged from the hospital after receiving psychiatric counselling regarding suicidal tendencies and ways to prevent it.

Discussion

Super Vasmol 33 is a type of emulsion-based dye containing 4 g of Para Phenylene Diamine (PPD) [6] and its other components are resorcinol, propylene glycol, Ethylene Diamine Tetra Acetic Acid (EDTA) and this toxic concoction is the most commonly used hair dye formulation in India. Each compound contributes to its toxicity hence it's very important to provide very vigilant supportive care as there is no specific antidote [5]. The main compound contributing to its toxicity is PPD. The most common clinical manifestation ranges from Acute Renal Failure (ARF), rhabdomyolysis, cervicofacial edema, and metabolic acidosis, rarely we can also see myocarditis, hepatitis, methemoglobinemia, hemolysis, hemoglobinuria convulsions, mucosal injury, and hypotension [1,2-8].

There are many mechanisms through which each compound of the hair dye contributes to different clinical manifestations which are as follows- development of rhabdomyolysis is mainly due to the PPD which is an aromatic amine [5] it damages the renal tubules in three ways first it as a direct toxic effect on kidneys due to its aromatic structure making it easy for resorption leading to its increased concentration, increasing the deposition of myoglobin cast in the tubules and lastly by promoting the release and leakage of calcium ions from the smooth endoplasmic reticulum causing irreversible change in musculature due to a constant state of contraction the above pathogenesis contributes to the clinical presentation in the form of hemoglobinuria (presents as chocolate brown colored urine), oliguria and Acute Renal Failure (ARF), metabolic acidosis and ARF contributing to hypovolemia [5,8]. Propylene glycol yet another compound is a highly nephrotoxic substance that causes metabolic acidosis as it creates a high anion gap and ARF [5]. Resorcinol which is a phenol derivative [2] is a highly corrosive substance and a protein denaturant that causes mucosal injury when in contact leading to the development of inflammatory cervicofacial edema leading to respiratory difficulties and stridor [6] certain studies have mentioned them to be neurotoxic manifesting as generalized tonic-clonic seizures [8]. The treatment is mostly supportive and symptomatic as there is no specific antidote it involves from tracheostomy for respiratory distress to renal replacement therapy in case of ARF. In between patient is treated with gastric lavage, antihistamines, steroids anti-emetics, proton pump inhibitors, and alkaline diuresis [1-10]. Forced alkaline diuresis is said to be a very efficient treatment as it is both preventive and curative it involves flushing out toxins by increasing the urine output. The rationale behind this is intravenous sodium bicarbonate increases the urinary pH making it alkaline as studies have shown that renal excretion is better in an alkaline medium (63 ml/min at pH 8.3) than in acidic conditions (0.14 ml/min at pH 5.1) for an increase in each unit of urinary pH is directly proportional to five times the renal clearance. Administration of Sodium bicarbonate increases urinary outflow by 4-6 ml/minute hence increasing the excretion of renal toxic substances by increasing the glomerular filtration rate. As patients undergoing forced alkaline diuresis are more prone to hypokalemia it should be administered along with potassium [1-9]. Globally suicide rates have increased by 60% in the 50 years, hence it is very important to provide proper psychological support as studies have shown future suicidal attempts are preventable with proper psychotherapy and counselling [11,12]. In this case, the diagnosis was made based on the history and the prognosis was good due to timely intervention (reaching a tertiary care hospital within 30 minutes of consumption) especially gastric lavage and the amount of hair dye consumed was less than 5 ml [6]. Serum creatinine is the most effective indicator to asses kidney damage [4] hence the patient's RFT was regularly monitored and was treated with forced alkaline diuresis. Hence a major crisis was averted due to prompt diagnosis and management of the patient. It is very important to remember the development of ARF in PPD intoxication does not occur in all patients it varies from 47.3% to 100% [5].

Conclusion

It is essential to raise awareness about this toxin among people, particularly in rural areas, and to enforce strict government regulations on its manufacture. Healthcare workers should be

educated about the various treatment options available, as early diagnosis and timely treatment can lead to better outcomes.

Declarations

Ethical approval and consent to participate: Institutional approval is not required to publish the case details.

Consent for publication: Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and material: Not Applicable.

Competing interest: No conflict of interest.

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Author's contribution: The corresponding author made all contributions in the acquisition of data, analysis, and interpretation; took part in drafting and writing the manuscript, revising and reviewing the article, gave final approval of the version to be published, and agreed to which journal the article has been submitted, and agree to be held accountable for all aspects of the work.

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