

Accidental poisoning with “Chinese chalk”

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Abstract. We present a 1.5-year old, 11 kg, female infant with a history of bronchial hyper-responsiveness who accidentally ingested half of a “Chinese chalk”. A day later, the infant showed vomiting, cough, fever, drowsiness, and irritability and her clinical conditions progressively worsened. She was admitted to the emergency department with cough, respiratory distress, and hepatomegaly. It has been reported that the chalk may contain deltamethrin and cypermethrin. The patient was successfully treated with supportive therapy. This report identifies “Chinese chalk” as a potential source of accidental poisoning in children and should be considered as part of the differential diagnoses in the emergency rooms since poisoning with these compounds may be misdiagnosed as organophosphate poisoning due to the presentation of similar symptoms. (www.actabiomedica.it)

Key words: Bronchial asthma, intoxication, poisonous effects, toxic potential

Introduction

Children aged 0-5 years appear to be a susceptible group for accidental poisoning at home, being pharmaceuticals and domestic products the most commonly implicated toxic agents (1, 2), with a death rate of 0.026%. “Chinese chalk”, or pesticide chalk, appears to be a commonly used product for in-house control of cockroaches. In Mexico, it can be easily found at very low prices in stores selling pesticides (approximately US\$ 0.50 at the time this paper was written). However, “Chinese chalk” and its components have not been legally commercialized. Furthermore, we did not find any previous reports of children accidentally poisoned with this product.

Case Report

A 1.5-year old, 11 kg, female infant with a history of bronchial hyper-responsiveness, accidentally ingested, at her home, half of a “Chinese chalk” (Figure

1). One day later, the infant showed vomiting, cough, fever, drowsiness, and irritability. She progressively worsened and a week later developed respiratory distress. She was admitted to the emergency department (ED) with cough, respiratory distress, Glasgow com-



Figure 1. Picture of a “Chinese chalk” similar to the one accidentally ingested by the child reported herein. The chalk can be obtained without any restriction in several countries

ma scale 14/15, and hepatomegaly. She was treated with nebulized salbutamol 0.03 ml/kg q4 h and ranitidine i.v. 1 mg/kg q8 h. A chest X-ray was found to be normal and there were no abnormal physiological findings. No electrolyte disturbance and no signs of dehydration were present.

The mother reported a delay in seeking medical attention for her daughter because of her perception of low toxicity for this type of chalk. The package insert provided with the product did not have any information on the components of the chalk. On the contrary, it had a label written in English stating: "*Kills cockroaches and ants effectively. Harmless to human beings and animals and safe to use*". The same label also appeared in Chinese, as it was verified by a professional interpreter.

After 24 hours in the ED, the infant showed a slightly improved clinical course and was hospitalized. She was treated with nebulized salbutamol q4 h, a single i.v. bolus dose of methylprednisolone 2.5 mg/kg followed by methylprednisolone i.v. 1.0 mg/kg q6 h. She received humidified oxygen 40% by facial mask. Because of a highly suspicious clinical picture of a community-acquired pneumonia, penicillin i.v. 100,000 IU/kg q4 h was added to her treatment.

A sample of the "Chinese chalk" was kindly analyzed by the Forensic Medical Service of the Honorable Tribunal Superior de Justicia del Distrito Federal, Mexico DF, through gas chromatography-mass spectrum (GC-MS). The analysis identified butylated hydroxytoluene (CAS No.: 128-37-0) and resulted negative for organophosphate pesticides.

The laboratory was not able to evaluate whether the Chinese chalk had the synthetic pyrethroids deltamethrin and cypermethrin due to a lack of an analytical method described in the literature and the lack of standards to attempt any validation by the service.

On the second day of hospitalization, the infant was transferred to an intensive care unit. Her respiratory rate was 68/min, heart rate 140 beats/min, and blood pressure 108/65 mmHg. She had bilateral diffuse rhonchi, hepatomegaly, and a Glasgow coma scale of 12/15.

In the intensive care unit, the patient was maintained under close clinical and non-invasive cardiovas-

cular and respiratory monitoring. The administration of humidified oxygen by facial mask was continued. A new chest X-ray showed no evidence of pneumonia. She showed a good clinical course without any evidence of bronchial spasm. Administration of methylprednisolone was discontinued. On day 3, her neurological status improved, and her liver progressively returned to its normal size as judged by abdominal palpation and ultrasound examination. On day 8, she was discharged from the hospital without any complication, and administration of salbutamol and penicillin was discontinued. She was followed-up monthly as an outpatient for the next 3 months, and no evidence of complications was observed.

Discussion

We have reported the case of a 1.5-year old girl who suffered from an accidental poisoning with "Chinese chalk". She showed a benign clinical evolution despite the fact that her evolution was complicated by her previous susceptibility to bronchospasm. It has been reported that the chalk may contain 0.71% of deltamethrin, a synthetic pyrethroid (3). The US Environmental Protection Agency (EPA) (URL: <http://www.epa.gov/pesticides/health/illegalproducts/index.htm>) states that overexposure to some chemicals found in samples of insecticide chalk can provoke serious health effects, including vomiting, stomach pains, convulsions, tremor, and loss of consciousness; serious allergic reactions are also possible. In addition, EPA identifies deltamethrin as the active component of the chalk. However, we found that it would also contain cypermethrin (Safer Pest Control in the Home; URL: http://pasture.ecn.purdue.edu/~epados/urbanPest/info_chalk.htm). According to the patent of the "Chinese chalk" (Science Finder, 2005), the insecticide chalk contains gypsum 92.5, CaCO₃ 3.5, peanut oil 0.5, cypermethrin 2.5, and water 1.0%, and the manufacturing process consists in dissolving cypermethrin in water, mixing it with the other raw materials, and shaping and drying it under sunlight. In our case, the analysis identified butylated hydroxytoluene which is a common antioxidant compound used in the preparation of rubber and petroleum prod-

ucts and fat-containing foods (Chemical Safety Information from Intergovernmental Organizations, URL: <http://www.inchem.org/documents/iarc/vol40/butylatedhydroxytoluene.html>). However, we considered it very unlikely that butylated hydroxytoluene may have produced any of the symptoms observed in this patient.

Pyrethrins can be absorbed across the gut and pulmonary membrane, but they are effectively hydrolyzed to inert products by mammalian liver enzymes (4). Such rapid degradation combined with relatively poor bioavailability may account for their low toxicity in humans. Pyrethroids are not cholinesterase inhibitors. However, poisoning with these compounds may be misdiagnosed as organophosphate poisoning due to the presentation of similar symptoms, and some patients have died from atropine toxicity administered in an attempt to control the symptoms (5).

In a non-medical website, it was reported that Poison Control Centers in the United States received 668 calls involving pesticide chalk between 1992 and 1995 (Safer Pest Control in the Home; URL: <http://pasture.ecn.purdue.edu/~epados/urbanPest/infochalk.htm>). Out of these, 94% of the cases were a result of eating the pesticide chalk and there was only one serious event reported when a child was found unconscious after swallowing a piece of chalk. However, we were unable to find any previous case of accidental exposures to “Chinese chalk” in humans reported either on PubMed (National Library of Medicine) or Science Finder Scholar Release 2007 (Chemical Abstract Service, American Chemical Society, Columbus, OH, USA). The controversies about its components may indicate that they may vary across the different countries where although the chalk has been illegally introduced it can be found at very low prices,

facilitating its use for in-house control of cockroaches. For example, in Mexico DF, the cost of a chalk was approximately US\$ 0.50 at the time this paper was written; the EPA reports a cost of US\$ 1.

In summary, accidental poisoning with “Chinese chalk” may occur in young children and therefore proper public preventive measures should be promoted for persons using this product for in-house control. However, it would be desirable if similar cases were reported in peer-reviewed medical journals in order to extend the experience in diagnosis and treatment of these cases as well as to have a more realistic perspective on how often the accidental ingestion of “Chinese chalk” occurs in children.

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