

Case Report

Accidental organophosphate poisoning in a child in Uyo, Nigeria: a public health alert

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Received: 05 May 2016

Accepted: 14 May 2016

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ABSTRACT

Organophosphates are often constituents of pesticides and insecticides. Some of these products are sold by unregistered vendors on the streets and in market places in sub-Saharan Africa. When purchased, and improperly stored, children may easily have access to, and inadvertently consume them. The clinical features of organophosphate poisoning include diarrhoea, diaphoresis, urination, miosis, bronchorrhoea, bronchospasm, bradycardia, emesis, lacrimation and salivation. Atropine administration is an important cornerstone of the management of this condition, with a good outcome in this instance. A case of organophosphate poisoning is herein reported to illustrate the effect of the predisposing factors to accidental childhood poisoning. It is hoped that this will help make an urgent case to raise public awareness on the prevention of accidental childhood poisoning, as well as the enforcement of regulations on the production, labeling, distribution and sale of these organophosphate compounds.

Keywords: Accidental, Organophosphate, Poisoning, Child, Atropine, Awareness

INTRODUCTION

Accidental childhood poisoning is a major cause of morbidity and mortality among children and it is usually due to a wide variety of medicinal and non-medicinal agents.¹⁻³ The prevalence of accidental childhood poisoning across different countries ranges from 0.74% - 7.2% of paediatric admissions,⁴⁻¹⁰ with organophosphate poisoning accounting for 7.5%-34.6% of cases of accidental childhood poisoning in Nigeria.^{9,11,12}

Organophosphates are often constituents of pesticides and insecticides.^{13,14} Some of these products are produced in an unregulated manner and sold by unregistered vendors on the streets and in market places in sub-Saharan Africa.¹⁵⁻¹⁷ When purchased, and improperly stored, children may easily have access to, and inadvertently consume them.^{13,18} Indeed, globally, organophosphate poisoning is the most significant cause of severe toxicity

and mortality resulting from acute poisoning.^{19,20} In developing countries it is responsible for 200,000 deaths annually.^{19,20}

We herein report a case of accidental organophosphate poisoning in a child in Uyo, Nigeria.

CASE REPORT

An 18 month old girl presented to the Children's Emergency Unit (CHEU) of the University of Uyo Teaching Hospital (UUTH), Uyo, Akwa Ibom State, Nigeria, on the 2nd of January, 2016 with a 9-hour history of excessive salivation, passage of frequent loose stools, and a 5-hour history of loss of consciousness.

She was in good health until about 10 hours prior to presentation, when she accidentally drank a portion of an insecticide mixture that was stored in an old bottle of fruit

juice. The bottle was left on a low table in the room, within reach of the child. About 50ml of the insecticide was drunk by the child. The eye-witness was the grandmother.

An hour later, she was noticed to be salivating excessively. There was no history of excessive lacrimation. At about the same time, she started passing watery loose stools. These occurred twice, with the stools smelling of the insecticide. She had two episodes of vomiting, and then lost consciousness 5 hours prior to presentation. There was no history of convulsions.

She was given coconut-water and palm-oil by the grandmother, and then rushed to the nearby secondary facility, an hour after ingestion of the insecticide. At that facility, she was given intravenous infusions and some intravenous medications [names unknown], but with no improvement in symptoms, and was then referred to UUTH. Other aspects of the history were not contributory.

She is the 2nd child of the parents in a monogamous setting. The elder sibling is alive and well. Her father is a 35 year old beer-palour operator with primary level of education, and her mother is a 28 year old patent medicine dealer, also with primary level of education. They live in a poorly ventilated 2-room house.

Physical findings

On physical examination she was found to be unconscious with a Modified Glasgow Coma Scale of 6/15 (E₄, V₁, M₁), with small-sized pupils but reacting normally to light, globally reduced muscle tone and deep tendon reflexes; febrile to touch with body temperature of 38.5°C, salivating excessively, capillary refill of <2 seconds, warm extremities, no loss of skin turgor, not jaundiced, not cyanosed, no pedal edema. Weight of 10 kg (90.9% of expected).

Respiratory system

Respiratory rate: 60/min; with laboured breathing.

Central trachea, normal chest and bilaterally symmetrical chest expansion.

Resonant percussion notes in all lung fields.

The breath sounds were vesicular with widespread transmitted sounds.

Cardio-vascular system

Pulse rate: 152/minute, small volume, and thready;

S₁, S₂ only. No murmurs.

Digestive system

Good oral hygiene, moist buccal mucosa, excessive salivation. Abdomen: full, soft and moved with respiration; the liver was not palpable; the spleen was not

palpably enlarged and the kidneys were not ballotable. The bowel sounds were normal.

Diagnosis

Organophosphate poisoning with hypovolemic shock.

R/o: chemical pneumonitis.

Laboratory findings

Urgent random blood sugar: 7.5mmol/L. Urgent Packed Cell Volume (PCV): 30%.

She was urgently resuscitated with intravenous normal saline, and she recovered consciousness after about an hour.

Intravenous Atropine 0.05mg/kg/dose was given twice, and the symptoms of excessive salivation, passage of loose stools and laboured breathing all abated. Pralidoxime was not available in the facility.

She remarkably improved after the atropine administration, and was discharged home in a satisfactory clinical condition after a 4-day stay in hospital.

The parents were also adequately counselled.

She is being followed-up at the out-patient clinic.

DISCUSSION

Accidental poisoning remains an important cause of morbidity and mortality worldwide with up to 84% of such mortality occurring in low and middle income countries.²¹ Organophosphates are common causes of childhood poisoning and may account for up to 34.6% - 56% of all cases of childhood poisoning.^{12,22}

Accidental childhood poisoning occurs commonly between the ages of 2 years to 8 years and most cases are presumed to be unintentional.^{13,18,23}

Organophosphates are a diverse group of chemical compounds having applications both in the home and in industries.²⁴ They currently find wide use as pesticides, herbicides and rodenticides.^{13,24}

Cheap locally-made preparations of organophosphates are widely available and unregulated in low income settings such as in Nigeria.^{11,13} These preparations are stored at home in old soft drink or juice containers which attract unsuspecting children resulting in unintentional poisoning as was seen in this index case.¹³ Ingestion is the commonest means of exposure as in the index case, although inhalation and direct absorption from the eye and skin have been documented.^{13,25}

Organophosphates lead to irreversible inhibition of the enzyme acetyl cholinesterase leading to the accumulation

of acetylcholine in various tissues and excessive parasympathetic activity.²⁶ Patients present within few hours of ingestion with respiratory distress, excessive salivation, vomiting and diarrhoea; muscle twitching, convulsions, coma and shock, most of which were observed in the index case, can be seen in severe cases.^{19,27}

The diagnosis is based on the history of exposure and findings of classical signs of organophosphate poisoning on examination, sometimes captured in the mnemonic “Dumbels” (Diarrhoea, Diaphoresis, Urination, Miosis, Bronchorrhoea, Bronchospasm, Bradycardia, Emesis, Lacrimation and Salivation).^{19,28}

The key diagnostic feature of organophosphate poisoning is a reduction in serum and red blood cell [RBC] cholinesterase activity.²⁹

Atropine is an effective antidote in the management of organophosphate poisoning, and is the mainstay of therapy worldwide and it was used with great success in the index case.^{25,30} However, the institution of treatment was delayed in the patient at the onset of symptoms, probably due to poor recognition of signs and symptoms at the referring centre, as atropine should usually be instituted “early”, “promptly”, and “rapidly”.^{19,30-32}

Pralidoxime is also effective but not easily available, particularly in resource-poor countries, as was seen in the management of this index case.^{13,31}

It is vital that health care providers working at primary and secondary level facilities (as was the case in the referring center in this report) should be informed of the hazards, clinical presentation of accidental organophosphate poisoning in children, and the key steps in its management.³¹

Prevention of accidental organophosphate poisoning is best achieved by strictly regulating the production, labelling and distribution of these compounds, discouraging the use of locally-prepared insecticide/pesticide mixtures, educating all users of pesticides/insecticides on the best practices with regards to safe storage, use and disposal of these compounds as well as examining other options for vector and pest control.^{13,16,17}

CONCLUSION

Organophosphate poisoning, and indeed other forms of accidental childhood poisoning can occur as a result of certain factors such as improper storage, placing medicinal and non-medicinal agents within easy reach of children, and poor living conditions. All of these factors were at play in this index case.

Additionally, there appeared to be a lack of recognition of the clinical features of organophosphate poisoning by the

attending health workers at the referring facility. As a result, appropriate measures such as the administration of atropine were not instituted at that facility.

Furthermore, there is unrestricted sale of these compounds by unregistered vendors, and this increases the risk of accidental childhood poisoning in the community.

There is therefore urgent need to raise public awareness on the prevention of accidental childhood poisoning, as well as the enforcement of regulations on the production, labeling, distribution and sale of these organophosphate compounds.

These will go a long way in ameliorating this public health concern.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Alazab RM, Elmougy MT, Fayad RA, Abdelsalam HF, Mohamed AS. Risk factors of acute poisoning among children: A study at a poisoning unit of a university hospital in Egypt. *South East Asia Journal of Public Health.* 2012;2(2):41-7.
2. Ugwu GIM, Okperi BO, Ugwu EN, Okolugbo NE. Childhood poisoning in Warri, Niger Delta, Nigeria: A ten year retrospective study. *Afr J Prm Health Care Fam Med.* 2012;4(1):321:1-5.
3. Adnan LHM, Kamaldin J, Mohamad N, Salatore SA, Suhaimi R (2013). The Risk of Accidental Chemical Poisoning Cases among Children (≤12 Years Old) Admitted to Hospital University Sains Malaysia: 5 Years Review. *J Clinic Toxicol.* 2013;4:177.
4. Adejuyigbe EA, Onayade AA, Senbanjo IO, Oseni SE. Childhood poisoning at the Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria. *Niger J Med.* 2002;11(4):183-6.
5. Ochigbo SO, Udoh JJ, Antia-Obong OE. Accidental Childhood Poisoning in Calabar at the turn of the 20th Century. *Nigerian Journal of Paediatrics.* 2004;31(3):67-70.
6. Oguche S, Bukbuk DN, Watila IM. Pattern of hospital admissions of children with poisoning in the Sudano-Sahelian North eastern Nigeria. *Niger J Clin Pract.* 2007;10(2):111-5.
7. Osaghae DO, Sule G. Accidental Childhood Poisoning in Benin City: Still a Problem? *CMS UNIBEN JMBR.* 2013;12(2):19-26.
8. Izuora GI, Adeoye A. A Seven-Year Review of Accidental Poisoning in Children at a Military Hospital in Hafr Al Batin, Saudi Arabia. *Ann Saudi Med.* 2001;21(1-2):13-5.
9. Yakubu M, Ahmadu BU, Simon P, Yerima TS, Umaru IH, Dauda MI. Pattern Of Accidental Childhood Poisoning In University Of Maiduguri

- Teaching Hospital: A Sudan-Sahelian Region Of Northern Nigeria. *International Journal of Phytopharmacy Research.* 2013;4(2):59-63.
10. Al Hamzi AM. Patterns of Accidental Poisoning in Children in Jeddah, Saudi Arabia. *Annals of Saudi Medicine.* 1998;18(5):457-9.
11. Belonwu RO, Gwarzo GD, Usman MB. Accidental Childhood Non-Food Poisonings in Aminu Kano Teaching Hospital Kano, Northern Nigeria. *Kanem Journal of Medical Sciences.* 2009;3(2):1-4.
12. Shwe DD, Toma B, Pate SI, Adedeji I, Oguche S. Profile of Hospital Admissions of Childhood Poisoning at a North-Central Nigerian Tertiary Health Care Centre. *Jos Journal of Medicine.* 2013;7(2):5-11.
13. Ibrahim A. Rodenticide poisoning in an unusual setting and its management challenges in a resource-limited setting: Report of three cases. *Journal of Medicine in the Tropics.* 2013;15(2):156-15.
14. Waddell BL, Zahm SH, Baris D, Weisenburger DD, Holmes F, Burmeister LF, Cantor KP, Blair A. Agricultural Use of Organophosphate Pesticides and Risk of Non-Hodgkin's Lymphoma Among Male Farmers (United States). *Cancer Causes and Control.* 2001;12:509-17.
15. Okeniyi JA, Lawal OA. Accidental Poisoning with Otapiapia: a Local Organophosphate-Containing Rodenticide: A Case Report. *The Nigerian Medical Practitioner.* 2007;52(4):100-1.
16. Musa U, Hati SS, Mustapha A, Magaji G. Dichlorvos concentrations in locally formulated pesticide (Ota-piapia) utilized in northeastern Nigeria. *Scientific Research and Essay.* 2010;5(1):049-54.
17. Pesticides Action Network (PAN) Nigeria. Strategic Assessment of the Status of POPs Pesticides Trading in South Western Nigeria. 2007:1-52.
18. Sowmya SG, Shreedhara Avabratha K, Aby D Varghese, Sanjeeva Rai B. Poisoning in Children: Experience at a Tertiary Care Hospital in Mangalore. *International Journal of Medical Science and Public Health.* 2014;3(11):1418-20.
19. Roberts DM, Aaron CK. Managing acute organophosphorus pesticide poisoning. *BMJ* 2007;334:629-34.
20. Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. *Q J Med* 2000;93:715-31.
21. World Health Organisation [WHO]. International Programme on Chemical Safety: Poisoning Prevention and Management. Available online: <http://www.who.int/ipcs/poisons/en/>. Accessed: 17/02/2016.
22. Ramdev S, Grover N, Sharma R, Sharma H. Acute poisoning in children: seven year experience at a tertiary care hospital of North India. *Curr Paediatr Res.* 2011;15(1):65-8.
23. Bacha T, Tilahun B. A cross-sectional study of children with acute poisoning: A three-year retrospective analysis. *World J Emerg Med.* 2015;6(4):265-9.
24. Katz KD, Brooks DE. Organophosphate Toxicity. Available online: <http://emedicine.medscape.com/article/167726-overview#a5>. 2016. Accessed: 15.02.2016
25. Zwiener RJ, Ginsburg CM. Organophosphate and Carbamate Poisoning in Infants and Children. *Pediatrics* 1998;81(1):121-6.
26. Van Heel W, Hachimi-Idriss S. Accidental organophosphate insecticide intoxication in children: a reminder. *International Journal of Emergency Medicine* 2011;4:1-4.
27. Lifshitz M, Shahak E, Sofer S. Carbamate and organophosphate poisoning in young children. *Pediatr Emerg Care.* 1999;15:102-3.
28. Rajendiran C, Ravi G, Thirumalaikolundu Subramanian P. Organophosphate, Carbamate and Rodenticide Poisoning in Children. *Indian Journal of Practical Pediatrics* 2009;11(1):6-14.
29. Kaur I, Jayashree K, Hiranandani M, Singhi SC. Severe Organophosphate Poisoning in a Neonate. *Indian Pediatrics,* 1996;33:517-9.
30. Kumar SV, Fareedullah MD, Sudhakar Y, Venkateswarlu B, Kumar EA. *Archives of Applied Science Research.* 2010;2(4):199-215.
31. Opawoye AD, Haque T. Insecticide/Organophosphate Poisoning in Children. *Annals of Saudi Medicine.* 1998;18(2):171-2.
32. Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. *Lancet.* 2008;371(9612):597-607.

Cite this article as: Ijezie E, Megbelayin F, Edem K, Ijezie AE. Accidental organophosphate poisoning in a child in Uyo, Nigeria: a public health alert. *Int J Sci Rep* 2016;2(5):106-9.