



Hemolysis Caused by Chlorpyrifos Consumption

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Abstract:

Intentional consumption of pesticides is a very common method of suicide in rural India. The easy availability of pesticides in rural households and the lethal effect they have on humans has led to an increasing number of cases every year. We present a case of 40 year old male presenting with hemolysis secondary to consumption of Chlorpyrifos, an organophosphorus compound. Hemolysis presenting in a case of organophosphorus compound is a rare manifestation. In our case, the patient presented with dark colored urine ten days after the consumption which has not been seen or reported before.

Key words: Pesticides, Suicide, Organophosphorus Compounds, Hemolysis, Poisoning.

Introduction

Pesticide poisoning accounts for as many as 3,00,000 deaths worldwide every year [1]. Most of them are intentional consumption for causing deliberate self-harm. These estimates are derived from hospital admissions where the cases are reported to authorities. The actual number of cases may be higher as many cases especially in private hospitals go unreported as the patients relatives try to avoid legal implications associated with it.

The first known pesticide was probably elemental sulphur dust used in Sumeria about 4500 years ago. Pesticide was used on a large scale after the discovery of dichlorodiphenyltrichloroethane in 1939 by Paul Muller. DDT was introduced in India in 1948 for the control of malaria. Production of these substances in India at an industrial scale

started in 1952 [2]. Presently there are a wide variety of compounds available at different strengths, most of which are fatal if consumed in humans. It is fairly easy to diagnose a case when history of consumption is available, in other cases a constellation of cholinergic signs and symptoms of toxicity coupled with laboratory evidence of low cholinesterase confirms the diagnosis. We present a case of 40 year old male presenting with hemolysis with hemoglobinuria secondary to consumption of Chlorpyrifos, an organophosphorus compound.

Case Report

A forty year old male was brought to the hospital eight hours after intentional consumption of an insecticide compound, Chlorpyrifos. The patient

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was unconscious with pulse of 120/min and blood pressure of 90/60 mm Hg. The patient was tachypnic with oxygen saturation of 68%. His pupils were constricted and he had fasciculations. Examination of his chest revealed bilateral crepitations.

He was administered a stomach wash and immediately intubated and put on ventilator support in view of his diaphragmatic weakness. Simultaneously atropine drip was started and the dose titrated according to clinical response. Pralidomine was administered along with intravenous fluids, proton pump inhibitors and antibiotics. His hemoglobin was 14 gm%, total leukocyte and platelet counts were normal. His serum cholinesterase levels were 2265 U/L. The patient was on ventilator for 3 days after which he was weaned off and extubated. The patient was discharged on 5th day with full recovery. The patient presented 2 days after discharge with drowsiness and breathlessness. On examination the patient had pallor and showed no signs or symptoms of cholinergic excess.

The patient was hospitalized and developed dark colored urine on the second day [Fig.1]. Hemogram showed hemoglobin 3.4 gm%, with total leukocyte count raised to 23,900 cells/mm³, peripheral smear revealed normocytic hypochromic anemia with marked anisopoikilocytosis suggestive of hemolytic anemia. Serum lactate dehydrogenase was increased to four times its normal value. Evaluations of other potential etiologies were negative. These tests included both direct and indirect Coombs' tests, erythrocyte osmotic fragility test, autohemolysis test, G6PD assay and antinuclear antibody. On urine examination free hemoglobin was detected in urine.

A diagnosis of organophosphorus compound induced hemolysis was made. The patient was managed with antibiotics and other symptomatic treatment. His urine color returned to normal on the



Fig.1: Dark colored urine secondary to Chlorpyrifos induced hemolysis.

fourth day and he was discharged on the 5th day.

Discussion

Cholinesterase inhibitors, the most common group of agricultural pesticides involved in poisoning, consist of two distinct chemical groups-organophosphates (OPs) and carbamates. They inhibit several members of the esterase group of enzymes, especially acetyl-cholinesterase and butyrylcholinesterase. The former is predominantly found in the synaptic clefts and on red cell membranes, while the latter is seen in the plasma [3]. Highest case fatality rates have been reported with poisoning due to aluminium phosphide, endosulphan and paraquat [4-6].

The commonly used OP insecticides are acephate, anilophos, chlorpyrifos, fenitrothion, methylparathion, monocrotophos, phenthoate, phorate, primiphos, quinalphos, temephos, etc. The compound our patient consumed, Chlorpyrifos, is a crystalline organophosphate insecticide. It's chemically an organothiophosphate with the chemical composition of O-diethyl O-3, 5, 6-trichloropyridin-2-yl phosphorothioate.

In agriculture, it remains “one of the most widely used organophosphate insecticides”, according to the United States Environmental Protection Agency. Like other members of its group it inhibits acetyl cholinesterase which hydrolyses acetylcholine. Binding of OP with acetyl cholinesterase leads to phosphorylation of the enzyme and this reaction is not easily reversible. It leads to a constellation of muscarinic and nicotinic symptoms and signs. Some of the complications associated with organophosphorus poisoning include respiratory failure, seizures; intermediate syndrome among others. OP poisoning has also been associated with some delayed manifestations like organophosphate-induced delayed neuropathy, myonecrosis, personality changes, schizophrenia and pancreatitis [7,8].

Very rarely it has been associated with acute hemolysis causing dark colored urine. In our patient this rare manifestation occurred one week after consumption of the compound. It has been reported for the first time with the compound Chlorpyrifos. Wu *et al.* reported similar findings in a patient with acute trichlorophon poisoning [9]. Basheer *et al.* and Vishwanathan also reported colored urine after acute OP poisoning but urine analysis in their patients was negative for hemoglobin and hence they attributed the color change to probable common metabolites of the compounds consumed [10,11].

It is important for physicians to be aware of these unusual presentations of organophosphorus compound poisoning. The patients who are treated for acute ingestion should be made aware of such delayed complications and advised to seek immediate medical attention should they occur.

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References

1. Eddleston M, Phillips MR. Self poisoning with pesticides. *BMJ* 2004; 328:42-44.
2. Gupta PK. Pesticide exposure-Indian scene. *Toxicology* 2004;19:83-90.
3. M. Lotti. Clinical toxicology of anticholinesterase agents in humans. In: R. Krieger (ed). *Handbook of Pesticide Toxicology*, Vol. 2 of Agents, San Diego, California, USA: Academic Press; 2001 pp. 1043-1085.
4. Van der Hoek W, Konradsen F. Risk factors for acute pesticide poisoning in Sri Lanka. *Trop Med Int Health* 2005;10:589-596.
5. Srinivas Rao C, Venkateswarlu V, Surender T, Eddleston M, Buckley NA. Pesticide poisoning in south India: Opportunities for prevention and improved medical management. *Trop Med Int Health* 2005;10:581-588.
6. Nagami H, Nishigaki Y, Matsushima S, Matsushita T, Asanuma S, Yajima N, *et al.* Hospital-based survey of pesticide poisoning in Japan, 1998-2002. *Int J Occup Environ Health* 2005;11:180-184.
7. Ladell WS. Physiological and clinical effects of organophosphorus compounds. *Proc R Soc Med* 1961;54:405-406.
8. Ngamdu YB, Sandabe MB, Kodiya AM, Isa A, Garandawa HI. Sudden Anosmia due to Otapiapia (Organophosphate Pesticide) Exposure. *Journal of Case Reports* 2012;2(2):8-9.
9. Rizos E, Liberopoulos E, Kosta P, Efremidis S, Elisaf M. Carbofuran-induced acute pancreatitis. *JOP* 2004;5:44-47.
10. Wu ML, Deng JF. Acute hemolysis caused by incidental trichlorfon exposure. *Journal of the Chinese Medical Association* 2009;72:214-218.
11. Viswanathan S. Unusual complications of quinalphos poisoning. *Case Reports in Emergency Medicine*. 2013; Vol. 2013, Article ID 809174.