

A Review Paper on Suspected Poisoning: A Case Series Report

Pankaj Chhikara¹, S.K Dhattarwal², Monika Jindal^{3*}

¹ Associate Professor, Department of Forensic Medicine, Pt. B.D. Sharma Pgims, Rohtak (Haryana), India

²Sr. Professor and Head, Department of Forensic Medicine, Pt. B.D. Sharma Pgims, Rohtak (Haryana), India

³Junior Resident, Department of Forensic Medicine, Pt. B.D. Sharma Pgims, Rohtak (Haryana), India

Abstract:- Aluminum phosphide (AIP) is a cheap solid fumigant and a highly toxic pesticide which is commonly used for grain preservation. Aluminum phosphide has currently aroused interest with increasing number of cases in the past four decades due to increased use in agricultural and non-agricultural purposes and its easy availability in the markets has increased its misuse to commit suicide. Upon contact with moisture in the environment, Aluminum phosphide undergoes a chemical reaction yielding phosphine gas, which is the active pesticidal component. Phosphine inhibits cellular oxygen utilization and can induce lipid peroxidation. It was reported that Aluminum phosphide has a mortality rate more than 50% of intoxication cases. Poisoning with Aluminum phosphide has usually occurred in attempts to suicide. It is a more common case in adults rather than teenagers. In some eastern countries it is a quite common agent with rapid action for suicide. Up to date, there is no effective antidote or treatment for its intoxication the oxidative outcomes of phosphine. This article reviews the experimental and clinical features of Aluminum phosphide intoxication and tries to suggest a way to encounter its poisoning.

Keywords:- Aluminum Phosphide, Phosphine, Management, Poisoning, Suicide.

I. INTRODUCTION

Aluminium phosphide (AIP) is used to preserve grains all over the world. It is also known as celphos and is one of the most dreaded poisons one can ever encounter in toxicology. The salt is usually available in tablet and pellet forms. Aluminium phosphide (AIP) poisoning is common in all parts of the world but is found more commonly in developing countries like India and is often implicated in accidental and suicidal poisonings in India.[1] The fatal dose is around 0.5 g and acute poisoning with these compounds may be direct due to ingestion of the salts or indirect from accidental inhalation of phosphine generated during their approved use. Many lives have been lost in the last three decades, especially among the young rural population of northern India. It is not just limited to the agricultural society, but the incidence is increasing in the urban families also. It is a highly toxic compound that releases phosphine gas on contact with moist surfaces and patients can present clinically with gastrointestinal (GI) haemorrhage, arrhythmias, shock, renal and hepatic failure, central nervous system disturbances

and ultimately leading to death in almost 100% of cases Most patients who survived had either taken a very small amount or the tablet had been exposed to air, thus rendering it non-toxic. Patients remain mentally clear till cerebral anoxia due to shock supervenes resulting in drowsiness, delirium, and coma. Several ECG changes ranging from ST segment elevation/depression, PR and QRS interval prolongation, complete heart block to ectopic and fibrillation have been observed. Reversible myocardial injury has also been reported [2] It is easily available and is purchased in some countries such as India under trade names e.g., Celphos, Quickphos, Synfume and Phosfume.[3]

The breath of patients who have ingested AIP has a characteristic garlic-like odour. Confirmation of diagnosis is based on the patient's history and a positive result (blackening) on tests of the patient's breath with paper moistened with fresh silver nitrate solution or by chemical analysis of blood or gastric acid for phosphine. Celphos poisoning has always been a big headache and menace for the intensivists throughout the world probably due to no availability of its antidote and 100% mortality.

II. MATERIALS AND METHODS

A review of three Autopsy cases of suspected poisoning, query celphos poisoning, brought to mortuary of pt. B.D Sharma Pgims Rohtak was done, and viscera was preserved for chemical analysis and sent to FSL.

III. OBSERVATION

➤ CASE NO/1

A 42Y/M came to Accident and emergency at a tertiary hospital in Rohtak, with A/H/O ingestion of unknown poisonous substance while working in field during daytime. Patient was succumbed to poison few hours after admission and treatment. Dead body was brought to mortuary for post mortem examination. The apparent cause of death as per police inquest papers was “celphos ki goli khane ke karan.”

Autopsy Findings: No external or internal injury were noted during the post-mortem examination, but mild cyanosis was present around lips and mouth.

Internal Examination: All abdominal organs were congested. Stomach and its contents contained about 400 cc of brownish mucoid material. Mucosa was deeply congested

and hemorrhagic at places. A foul-smelling garlicky odour was present. Viscera was preserved and sent for chemical analysis to FSL.



Fig 1:- Case No.1

➤ CASE NO/2

A 16Y/F, came to Accident and emergency at a tertiary hospital in Rohtak, with A/H/O ingestion of unknown poisonous substance at home in early evening hours. Patient was succumbed to poisoning few hours after admission and treatment. Dead body was brought to mortuary for post mortem examination. The apparent cause of death as per police inquest papers was “celphos ki goli khane ke karan.” Autopsy Findings: No external or internal injury was noted during the post-mortem examination. On Internal Examination: All abdominal organs were congested. Stomach and its contents contained about 100 cc of greyish brownish mucoid material. A foul-smelling garlicky odour was present. Mucosa was deeply congested and haemorrhagic at places. Viscera was preserved and sent for chemical analysis to FSL.



Fig 2:- Case No.2

➤ CASE NO/3

A patient 40 Y/M got admitted in emergency department at a tertiary hospital in Rohtak, with A/H/O ingestion of unknown poisonous substance at home during late night hours. MLC was prepared and gastric lavage was done. Patient was succumbed to poisoning few hours after admission and treatment. Dead body was brought to mortuary for post mortem examination. The apparent cause of death as per police inquest paper was “celphos ki goli khane ke karan.”

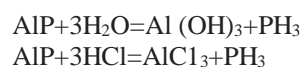
Autopsy Findings: No external or internal injury was noted during the post-mortem examination. On Internal Examination: All abdominal organs were congested. Stomach and its contents contained about 200 cc of brownish mucoid material. Mucosa was deeply congested and haemorrhagic at places. A foul-smelling garlicky odour was present. Viscera was preserved and sent for chemical analysis to FSL.



Fig 3:- Case No.3

IV. DISCUSSION

Celphos is formulated as a greenish gray tablet of 3 g, which in the presence of moisture or HCl, releases phosphine:



The residue, $\text{Al}(\text{OH})_3$ is non-toxic. AIP, when ingested, liberates a lot of phosphine (PH_3) gas in the stomach, which has a very pungent smell. Phosphine gas is rapidly absorbed from the gastric mucosa and, once it gains access to bloodstream, it reaches various tissues and at cellular level inhibits the mitochondrial respiratory chain and hence leads to cell necrosis and death. It has been suggested that phosphine leads to non-competitive inhibition of the cytochrome oxidase of mitochondria, blocking the electron transfer chain and oxidative phosphorylation, producing an energy crisis in the cells.[4]

V. RESULTS AND CONCLUSION

In all the above three cases, aluminium phosphide was detected in exhibits sent to FSL. Males were affected more commonly than females. Garlicky odour was characteristic in most of the cases. The above cases had a shorter period of survival. The case fatality ratio has been escalating since the last decade. Strict implementation of nationwide pesticide regulation, including restricting the availability of poison, being aware of its toxicity and providing improved medical management in consultation with regional or national poison control centres could further reduce the mortality due to Aluminum phosphide (AIP) toxicity as there is no antidote available presently.

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