

# Submucosal Haemorrhage in Celphos Poisoning: Postmortem Study and Chemical Analysis

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## Abstract

Poisons are commonly involved in homicidal, accidental or suicidal cases. In India Aluminum Phosphide (ALP) is available as white tablet of Celphos commonly used as grain preservative. After ingestion on coming in contact with moisture ALP liberates Phosphine gas (PH<sub>3</sub>) having pungent odour. The chemical reaction is accelerated by the presence of HCL in the stomach. Phosphine is rapidly absorbed from gastric mucosa by simple diffusion and cause damage to the internal organs. Several studies reported 100% necrosis of mucosa in ALP poisoning but still no specific antidote are available for it. ALP poisoning was found to be the major cause of death among all cases of poisonings. Several suspected visceral samples for detection of poison were examined in Forensic Science Laboratory, Bihar, Patna. The present study was conducted on those 25 visceral samples in which mucosal haemorrhage was reported in their postmortem finding and gave positive result in preliminary examination of Celphos. Other parameters such as age, sex, causes of consumption of poison (suicidal, homicidal or accidental) as mentioned in FIR was also studied. Chemical analysis was done using Thin layer Chromatography technique. Aluminium Phosphide was found positive in all 25 visceral samples. Aluminium Phosphide poisoning has become the commonest poison in most of the cases of suicidal consumption. In India Despite its alleged high toxicity ALP is frequently used as grain preservative, which can be replace by using old traditional medicinal techniques like Neem leaf (*Azadirachta indica*), Turmeric (*Curcuma longa*), Tulsi (*Ocimum tenuiflorum*) etc. Aluminium phosphide (ALP) poisoning (Celphos) has emerged as a common cause of accidental poisoning in children with mortality ranging from 37-100%. These pesticides should not easily available. Sale of poison should be control by strict law. Any negligent conduct with respect to poison resulting in damage to a person is punishable. Since, it has no specific antidote so management remains primarily supportive care. Toxicologists, Biotechnologists and other research scientists should work on such antidote that quickly counteract the effects of poison.

**Keywords:** Viscera, Aluminium Phosphide and Submucosa haemorrhage.

## Introduction

Poisons are commonly involved in homicidal, accidental or suicidal cases. In India Aluminum Phosphide (ALP) is available as white tablet of Celphos commonly used as grain preservative. After ingestion on coming in contact with moisture ALP liberates Phosphine. The chemical reaction is accelerated by the presence of HCL in the stomach. Phosphine is rapidly absorbed from GI tract by simple diffusion and cause damage to the internal organs. Its poisoning has a high mortality and recent years have seen an increase in the number of poisoning cases and deaths caused by suicidal ingestion. Aluminium phosphide has a fatal dose of between 0.15 and 0.5 grams (0.0053 and 0.0176 oz)(1). The mortality rates from AAIPP vary from 35 to 85 percent(2). In a 25-year-long study on 5,933 unnatural

deaths in northwest India, Aluminium phosphide poisoning was found to be the major cause of death among all cases of poisonings (3). AIP toxicity is mainly treated by supportive approaches(4) since, it has no antidote. Various antioxidants have been investigated with considerable efforts, but discrepancies exist among the findings.

### Material and Methods

Several suspected visceral samples for detection of poison were examined in Forensic Science Laboratory, Bihar, Patna. The present study was conducted on those 25 visceral samples in which mucosal haemorrhage was reported in their postmortem finding and gave positive result in preliminary examination of Celphos. Other parameters such as age, sex, causes of consumption of poison (suicidal, homicidal or accidental) as mentioned in FIR was also studied. Chemical analysis was done using Thin layer Chromatography technique (5).

### Result

Aluminium Phosphide was detected in 25 visceral samples in which 12 female visceral samples varying in age from 17-40years and 13 males visceral samples varying in age from 25-50years were studied. Postmortem report revealed that mucosal haemorrhage were noted in all 12 females and 13 males. All examined 25 visceral samples had different cases of poison consumption. Sample no. 5 was reported 20 years female suicidal death her mucosal membrane was badly congested. Sample no. 9 was reported 25 years female homicidal death. Her stomach contained 100 ml dark brown slaty liquid with pungent smell and deeply congested mucosa with several sub mucosal haemorrhage spots found. Sample no. 10 was 17 years female accidental death her stomach contained dark coloured watery liquid with pungent smell with congested gastric mucosa and sub mucosal partly haemorrhage at several places. Sample no.12 was 40 years female suicidal death her mucosal membrane was highly congested contained blood tinged liquid about 200 ml intense odour coming out. Similarly in visceral sample no.1,2,3,4,6,7,8 and 11 of female with different age group and different manner of death were also reported mild mucosal erosion and gave positive test for Aluminium Phosphide poisoning whereas in case of male visceral samples in which Aluminium Phosphide was confirmed, the sample no. 1 was 30 years male cause of death was not clearly mentioned stomach contained thick paste like whitish colour substance with pungent smell with mucosal erosion. Sample no.3 was 38 years male suicidal death, mucosa membrane effected with scanty fluid having garlicky odour. Sample no.8 was 28years male homicidal death, having congested gastric mucosa. Sample no.9 was 29 years male suicidal death habitual of taking alcohol his stomach contained about 200 ml of greenish fluid with pungent smell, mucosal haemorrhage. . Sample no. 11 was 50 years male homicidal death mucosal haemorrhage . Sample no.12 and 13 were about 38 and 45 years unknown male cause of death not clearly mentioned his stomach contained 160ml yellowish brown, watery liquid with garlic smell and congested gastric mucosa and partially sub-mucosal haemorrhage spots were found at several places. Similarly in case of sample no.2,4,5,6,7 and 10 with different age group and different manner of death were reported mild mucosal erosion also gave positive test for Aluminium Phosphide poisoning.

### Discussion

The present study revealed usual features of ALP poisoning namely gastrointestinal upset. It is a highly toxic compound that releases phosphine gas on contact with moist surfaces and patients can present clinically with gastrointestinal (GI) hemorrhage, arrhythmias, shock, renal and hepatic failure, central

nervous system disturbances and ultimately leading to death in almost 100% of cases(6,7,8). Celphos causes acute esophageal mucosal injury in the form of ulcers, leading to upper gastrointestinal bleeding in the acute phase (9). PH<sub>3</sub> gas is a mitochondrial poison which inhibits cytochrome c oxidase, it leads to generation of reactive oxygen species; so, one of the most important suggested mechanisms for its toxicity is induction of oxidative stress (10). Aluminium Phosphide was detected in 12 female visceral samples varying in age from 17-40years and 13 males visceral samples varying in age from 25-50years in which extensive hemorrhages was noted along the gastrointestinal tract at autopsy as mentioned in postmortem report. Similar autopsy findings due to corrosive action of Aluminium Phosphide was also reported by Behera et al; 2017(11). In this present study of ALP poisoning their post mortem report also reveals some other features like stomach contained dark coloured watery liquid with pungent smell, mucosal membrane was highly congested contained blood tinged liquid, stomach contained yellowish brown , watery liquid with garlic smell etc. which also corroborates with the studies of Jain et al; 2005(12). Their cause of consumption as mentioned in FIR were also suicidal, homicidal or accidental. Aluminium phosphide (ALP) poisoning (Celphos) has emerged as a common cause of accidental poisoning .These pesticides are easily available because despite its alleged high toxicity ALP is frequently used as grain preservative which can be replaced by using old traditional medicinal techniques like Neem leaf (*Azadirachta indica*), Turmeric (*Curcuma longa*), Tulsi (*Ocimum tenuiflorum*) etc(13). Mortality rate in clinical reports is stated to vary between 37-100% by different authors (14,15,16). Since, it has no specific antidote so management remains primarily supportive care. Several house hold remedies also gave therapeutic outcome in some Phosphide Poisoning case(17) .

### Conclusions

Aluminium Phosphide Poisoning has become the commonest poison in most of the cases of suicidal consumption. It is extremely toxic .These pesticides should not easily available. Sale of poison should be controlled by strict law (poison act or drugs act or pharmacy act). Any negligent conduct with respect to poison resulting in damage to a person is punishable. Since, it has no specific antidote so management remains primarily supportive care. Further study is required to explore quick therapeutic management to overcome fatal poisoning cases. More amelioration strategies needed to aware people. Early diagnosis and its exact mechanism of action is also required. Toxicologists, Biotechnologists and other research scientists should work on such antidote that quickly counteracts the effects of poison.

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