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# Acute Anterolateral Myocardial Infarction Due to Aluminum Phosphide Poisoning

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ABSTRACT

Aluminum phosphide (AlP) is a highly effective rodenticide which is used as a suicide poison. Herein, a 24-year-old man who'd intentionally ingested about 1liter of alcohol and one tablet of AlP is reported. Acute myocardial infarction due to AlP poisoning has been occurred secondary to AIP poisoning. Cardiovascular complications are poor prognostic factors in AlP poisoning

## Introduction:

Aluminum phosphide (AlP) is a highly effective rodenticide which is famous in the name of rice tablet in Iran, owing to its frequent usage to protect rice from rodents (1). It is a dark brown or grayish tablet that is considered as a powerful rodenticide and fumigant. Unfortunately, this tablet is a potent route of suicide even 1/6 (500mg) of atablet May be fatal in case of immediate consumption after being out of its cover and before reaching the expiration date. Phosphine gas ($PH_3$) released after exposure to air humidity and it is the reason for wide range of severe manifestations (2). AlP mortality rate is as high as 70-100% (3). Phosphine is a cellular toxin that inhibits mitochondrial oxidation of cytochrome c and impaired cellular inspiration. As a result, anaerobic respiration replaces aerobic respiration which leads to high level of lactic acid and progressive refractory metabolic acidosis. Almost all organs and systems are affected especially respiratory, cardiovascular and nervous systems which are the most important affected systems. It is also a gastrointestinal irritant (4). Progressive hypotension and metabolic acidosis may occur in severe poisoning; while the patient is conscious until end stages of disease. Death often occurs after few hours (4) Cardiovascular manifestations have been reported in this setting and electrocardiographic (ECG) abnormalities occur in significant exposures; reversible myocardial injury is expected too (4). In this study a young man with acute

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myocardial infarction due to aluminium phosphide poisoning is reported.

**Case presentation:**

A 24-year-old man was admitted to Imam-Reza hospital, Mashhad, Iran, 30 minutes after intentionally ingesting 1liter of alcohol then a tablet of AlP. At first, he was very toxic with cold extremities, his pulse rates were undetectable and pulse oximeter could not detect oxygen saturation; systolic blood pressure was 70 mm/Hg. Owing to the history of alcohol consumption, serum methanol concentration was measured which was undetectable. It was important because formic and lactic acidosis secondary to methanol poisoning could be added to lactic acidosis due to AlP poisoning which might deteriorate this situation. Gastric lavage was performed with potassium permanganate and sodium bicarbonate; infusion of intravenous crystalloid started and central vein catheter was placed with close monitoring of central vein pressure. Intra venous hydrocortisone ( 100 milligram per 8 hours), intravenous infusion of magnesium sulfate 20% ( 2 gram every 8 hours), intravenous infusion of calcium gluconate 10% ( 1 gram every 8 hours) and N-acetylsystein ( 150 mg/kg in 200 ml Normal saline 0.9% for 20 minutes then 50 mg/kg in 500 ml Normal saline 0.9% during four hours and then 100 mg/kg in 1000 ml Normal saline 0.9% during 24 hours) were administered based on recommendations of Goldfrank Toxicologic Emergencies book as a reference of clinical toxicology (4), vials of sodium bicarbonate were infused based on recommendation for treatment of acute lactic acidosis (5). Despite all these, laboratory data revealed severe metabolic acidosis. ECG was obtained every 2 hours; 12 hours later cardiac monitoring showed ECG changes and ECG revealed extensive antero lateral myocardial infarction (MI) accompanied with reciprocal changes in inferior leads (Fig.1).

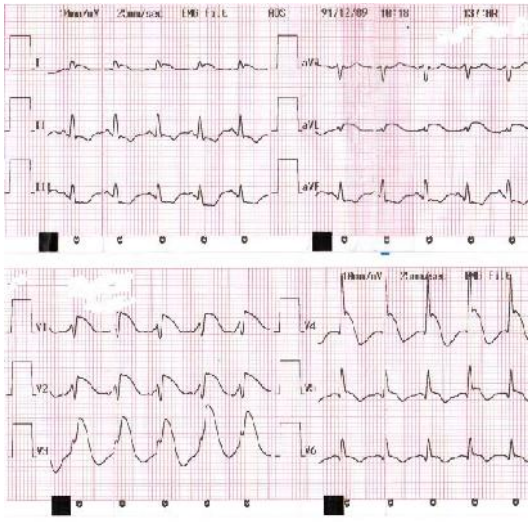

**Figure. 1:** Extensive antero lateral myocardial infarction accompanied by reciprocal changes in inferior leads

Cardiology consult was done; Troponin I (TPI) was requested, bed side echocardiography showed left ventricular ejection fraction (LVEF) of 40% and acute myocardial infarction was treated medically. Vasopessors were administered when there was no response to adequate hydration. Inspite of adequate supportive treatment, he died after 24 hours.

**Discussion:**

AlP poisoning has a high mortality rate nd is considered as an important emergency in toxicology. Cardiac and hemodynamic impairment are the most causes of mortality in this setting (6,7). Previous studies show ECG changes in acute AIP poisoning; such as ST-T changes, dysrhythmia, QTc prolongation and bundle brunch block (8). A study in Morroco which was performed on two cases reveald that: both ST elevation and abnormal repolarization in one case and ventricular hypokinesia with impaired ejection fraction (30%) in the other patient were reversible (7). During 7

years, a retrospective study was performed in Tehran. It reported that cardiovascular manifestations were the most common signs and symptoms of AlP poisoned patients, and ECG abnormalities were predictors of poor prognosis (9).

In another study, 20 patients with AlP poisoning were evaluated. Of them, 45% had dysrhythmia, and 45% had elevation of ST segment. In this study, cardiac manifestations and ECG findings were significantly correlated with poor prognosis (8). In our patient, simultaneous consumption of ethanol and AlP could have a role in rapid progression of hypotension as well as loss of consciousness and respiratory depression. The patient had no history of any cardiovascular abnormality before AlP poisoning. Even though dysrhythmia, myocardial injury and ST-T changes have been reported in this setting, but myocardial infarction findings including: ST elevation in especial leads accompanied with reciprocal changes is not common. Trimethazidine, an anti-ischemic drug, may be effective in treatment of cardiac manifestations but unfortunately it is not available in Iran (10). There are limited documents on usefulness of intra aortic balloon pump placement in patients with refractory hypotention due to AlP poisoning, but it requires more investigations (11). It may be useful to check the ventricular ejection fraction frequently, and if there is a downward progression, intra aortic balloon pump placement is considered. However, more studies are needed to be done to find an appropriate treatment for this condition and other cardiovascular complications of this highly fatal poisoning.

## Conclusion:

Although acute MI is not common in a 24 y/o man, it may occur in AlP poisoning. Cardiovascular complications are poor prognostic factors in this setting.

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## Conflict of interests:

The authors have no conflict of interests.

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