

Aluminium Phosphide Poisoning: Clinical Profile and Outcome of Patients Admitted in a Tertiary Care Hospital

Muhammad Arshad Qureshi, Shahid Nadeem, Tufail Ahmed, Fariha Tariq, Humaira Rehman, Altaf Pervez Qasim

ABSTRACT

Background: Acute poisoning is a significant health problem being the leading cause of morbidity and mortality all over the world. Poisoning due to ingestion of Aluminum Phosphide & Organophosphates is considered among the commonest poisons leading to fatal consequences. **Objective:** To study the clinical profile and outcome of the patients with (Wheat Pills) Aluminum Phosphide (ALP) poisoning brought to the District Head Quarter (DHQ) Teaching Hospital, Sahiwal. **Setting & Duration:** The study was carried out in DHQ Hospital Sahiwal (a tertiary care health institution attached with Sahiwal Medical College, Sahiwal, Pakistan) for the period of one year i.e. 1st January, 2017 to 31st December, 2017. **Methodology:** The patients above 12 years of either gender brought to the DHQ Hospital Sahiwal, with history of ingestion of (wheat pills) Aluminum phosphide; were included in study by non-probability convenient sampling. The data retrieved from the hospital record / treatment charts of the patients admitted in Accident & Emergency / Medical Units. Prior permission from the controlling authorities was also taken. The data entered in predesigned proforma for further analysis. **Results:** Of the total one hundred & ten patients; 94(85.45%) belonged to the younger age group 12-30 years while 65(59.1%) cases of Aluminium Phosphide poisoning were females & 45(40.9%) males. Similarly, females represented 30(27.27%) poisoning cases compared to males 16(14.54%) in the age stratum 12-20 years. Majority 48(43.63%) cases were between the age group of 21-30 years. The intake of Aluminium Phosphide with suicidal intent was found in 82(79.6%) cases. The frequent clinical features were Shock / Tachycardia observed in 32(29.1%) cases whereas 62(56.36%) patients couldn't survive in spite of extensive resuscitation. **Conclusion:** Aluminium Phosphide is frequently used poison with suicidal intent especially in the younger population. Shock / Tachycardia were the most frequent clinical presentation of the patients. Mortality rate was higher in Aluminium Phosphide poisoning in spite of resuscitative measures. No antidote is available so far whereas role of magnesium sulphate and coconut oil are controversial. **Recommendations:** Situation could be improved by reducing the occupational exposure, resolving the conflicts leading to self-poisoning & adequate training of the medical / paramedical staff in poisoning management at the primary, secondary and tertiary care hospitals. Proper legislation is to be done for strict control on the sale of aluminium phosphide. Further research is required to find out the effective antidote in order to reduce the mortality because of aluminium phosphide poisoning.

Keywords: Poisoning; Wheat Pills; Aluminium Phosphide; Clinical Profile; Outcome; Suicide.

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INTRODUCTION

Poisoning is a major health problem due to high morbidity and mortality throughout the world.¹ Approximately, 84% fatalities in the world resulting from poisoning are in the under developed countries.² Variety of factors are related to clinical presentation of acute intoxication which include time interval between poisoning & reaching to the hospital, type / nature of poisonous substance, biochemical properties of poisoning material, the consumed amount or dose of poison, age and health of the victim as well as underlying medical illnesses.^{3,4} Clinical features may include gastrointestinal symptoms, cholinergic symptoms, cardiac arrhythmias, hypotension, dyspnea, shock and symptoms related to the nervous system i.e. headache, numbness, tremors, blurred vision, seizures, confusional state, coma etc.⁴⁻⁵ One of the major reasons for suicidal poisoning is the easy availability of less expensive toxic substance. Widespread use of the rodenticide and agrochemicals, pose a serious threat due to their lethal effects on human beings.

Aluminium phosphide (ALP) is a solid fumigant pesticide, used for preservation of wheat & rice since long. It is cheaper & easily available in market with the name of tablets Celphos, Alphos, Quickphos, Phostoxin, Phosphotex, etc. When it comes in contact with moisture, Phosphine gas is liberated which is very toxic and lethal for the insects, pests and rodents. It is very harmful for human beings due to lethal effects, when released in stomach after ingestion of Aluminium phosphide and absorbed into the circulation.



Phosphine produces unrestricted organ damage due to cellular hypoxia resulting from its binding to Cytochrome oxidase. The interference with transmembrane exchange of electrolytes causes acute cardio toxicity and may lead to focal myocardial necrosis. Aluminium phosphide or wheat pill is misused by a large number of patients with suicidal intent and more concerning is that mortality associated with Aluminium phosphide (ALP) poisoning is very high.⁶ Although limited data

is available in Pakistan regarding Aluminium phosphide poisoning but still it is labelled as the second commonest cause among unintentional injuries in a national health survey of Pakistan.⁷⁻¹⁰

The present study was carried out to determine the clinical profile and outcome of the patients presenting to a teaching hospital with history of acute Aluminum Phosphide poisoning. It will be helpful for medical professionals / consultants working in emergency department and general practitioners for early diagnosis and management of such patients. Poisoning is preventable and early recognition of clinical manifestations will be beneficial for management of patients and making effective strategies. Enhanced awareness drive for the healthcare professionals as well as the common public will also be helpful to reduce the morbidity and mortality resulting from the cases of poisoning.

METHODOLOGY

Study Design: Retrospective study.

Place of Study: Accident & Emergency Department / Medical Units of DHQ Teaching Hospital, Sahiwal, Pakistan.

Duration of Study: 1st January, 2017 to 31st December, 2017

Sample Technique: Non-probability convenient sampling

Sample Size: 110 cases

Inclusion Criteria: Patients with history of ALP poisoning of more than 12 years age of either gender were included.

Exclusion Criteria: Patients with history of food poisoning.

Method: The study consists of 110 patients with history of Aluminium phosphide poisoning. An informed consent was obtained from patients or their relatives and permission was taken from concerned authorities.

The patients fulfilling the inclusion criteria were registered through Accident & Emergency Department and then shifted to the Department of Medicine, DHQ Teaching Hospital, Sahiwal. Ingestion of a substance leading to self-harm was defined as acute poisoning whereas Intentional poisoning was considered as suicidal while un-intentional intake of poison as accidental.

A structured questionnaire was used covering demographics (age, gender, residential background, socioeconomic status) and clinical profile (symptomatology and clinical presentation, underlying reasons for poisoning, intention of poisoning and nature of agents). A predesigned proforma was used to enter the data. For numerical variables (e.g. age), mean \pm SD was calculated; while for categorical variables (gender, type of poison, intention of poisoning and clinical presentation) frequencies and percentages were calculated.

RESULTS

Out of the total 110 patients of Aluminium Phosphide poisoning; 45(40.9%) were males and 65(59.1%) females. Majority 48(43.63%) were in the age group of 21-30 years followed by adolescents of 12-20 years involving 46(41.81%) cases. Age & Gender distribution is shown in Table-1. The Shock / Tachycardia were observed in 32(29.1%) victims of ALP poisoning followed by confusional state / drowsiness in

23(20.9%) cases. various clinical features shown in Table-2. History of ingestion of aluminium phosphide poison with suicidal intent was reported in 87(79.1%) patients whereas accidental poisoning occurred in 23(20.9%) cases. Manner of ALP poisoning is given in Fig-1. As far as final outcome is concerned; 62(56.36%) patients couldn't survive in spite of all resuscitative measures whereas 48(43.64%) survived & discharged from hospital after the necessary treatment. Final outcome of (n=110) ALP poisoning cases is shown in Fig-2.

Table 1: Age & Gender Distribution in Aluminium Phosphide Poisoning cases (n=110)

Gender	Age Groups (Years)				Total
	12-20	21-30	31-40	Above 40	
Male	16 (14.54%)	20 (18.18%)	6 (5.45%)	3 (2.72%)	45 (40.9%)
Female	30 (27.27%)	28 (25.45%)	6 (5.45%)	1 (0.9%)	65 (59.1%)
Total	46 (41.81%)	48 (43.63%)	12 (10.90%)	4 (3.63%)	110 (100%)

Table-2: Clinical Profile of Patients with Aluminum Phosphide Poisoning (n=110)

Clinical Manifestations	Frequency	Percentage
Salivation / Nausea / Vomiting	19	17.2 %
Drowsiness and confusional state	23	20.9 %
Pupillary changes / Lacrimation	11	10.0 %
Dyspepsia & Loose motions	10	8.1 %
Shock / Tachycardia	32	29.1 %
Headache & Vertigo	15	13.7 %
Total	110	100 %

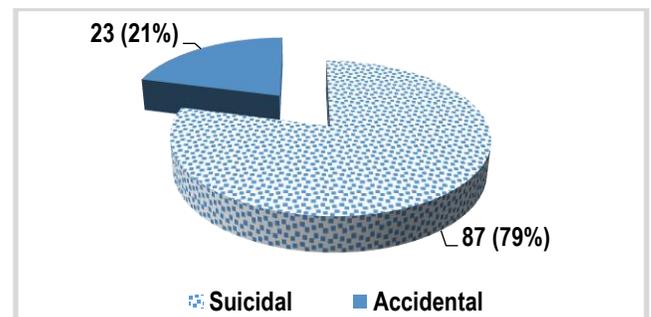


Fig 1: Manner of aluminium phosphide poisoning (n=110)

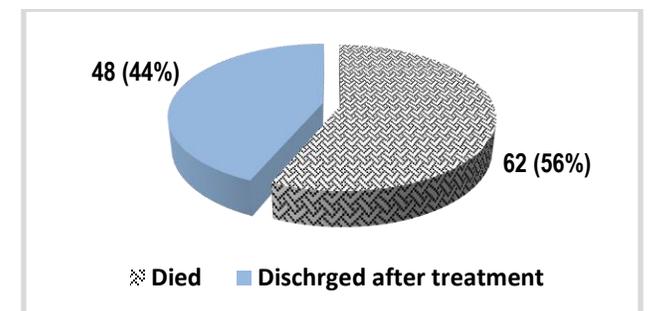


Fig 2: Outcome of aluminium phosphide poisoning (n=110)

DISCUSSION

During the last decade, a dramatic rise in substance abuse, drug abuse and use of various types of poisoning agents has been experienced all over the world. Similar trends have also prevailed in both advanced and developing countries like ours. The current study identified Aluminium Phosphide as the most frequently used poison in both genders and in the younger age groups. This heavy number of poisoning in the young population may be due to widespread reasons like impulsive behavior, failure in love, peer pressure, broken families, professional dissatisfaction, etc. which precipitates the chances of self-poisoning in such cases.¹¹ The negative life events are one of the important factors leading to the suicidal tendency and in this study, 87(79.1%) cases of younger age group committed suicide by using wheat preserving pills. The findings of this study are consistent with those of Pyar et al¹² whereas a study conducted by Khan et al¹³ documented that organophosphate compounds were the second most frequently used poisoning agent in males and the poison of choice in females.

Current increase in magnitude of poisoning is related to the easy availability of medications over the counter as well as storage of the organophosphates, Aluminium Phosphide and pesticides at home. The increasing number of poisoning cases is attributed to the marketing of modern agrochemicals while their toxic effects are not known to the users.¹⁴ In the current study, 59.1% females were observed to be victims of acute ALP Poisoning. Desalew et al¹⁵ and Zhang et al¹⁶ reported involvement of majority females in Aluminium Phosphide poisoning whereas 66.4% women were observed by Saglam et al¹⁷ to be affected by acute poisoning of wheat preserving pills. Similar trend of gender distribution was observed by Sadia et al¹⁸ in a study conducted on 100 patients of acute poisoning involving 58% females compared to 42% males in the patients of Aluminium Phosphide poisoning. This female preponderance might be due to the fact that females are more prone to negative cultural influences and domestic stress as compared to males. Another study conducted in Peshawar by Muhammad et al¹⁹ reported that 63.1% females were found involved in acute poisoning cases which are consistent with the results of our study.

As regard clinical manifestations; shock & tachycardia were observed in 32(29.1%) cases of Aluminium Phosphide (ALP) poisoning and 23(20.9%) cases presented with confusion / drowsiness whereas 10(8.1%) cases complained of dyspepsia & loose motions at the time of arrival in hospital. Aluminium Phosphide poisoning has very poor prognosis. The cardinal signs are hypotension, acidosis & shock. Due to non-availability of any specific antidote; most of the treatment is supportive which include maintenance of airway, breathing & circulation (ABC). An intravenous fluid i.e. 0.9% normal saline is given to avoid hypotension.

Keeping in view the manner of poisoning; our study revealed that 87(79.1%) patients ingested ALP poison with suicidal intent while accidental poisoning occurred in 23(20.9%) cases but no case was reported to be homicidal. Finding of our study are almost in line with those of a recent research conducted by

Sadia et al¹⁸ in Sargodha on 100 hundred patients of acute poisoning; it was reported that the commonest poison used was ALP (wheat preserving pills) in 35% cases and of those; the substance was reported to be used with suicidal intent in 72% cases. The accidental intake was observed in 17% cases whereas the homicide was reported in only 5% cases. The finding of our work is slightly different from those of few studies conducted in the neighboring countries; as ALP poisoning was reported to be responsible for 25% of all attempted suicides in India as well as 31% of the fatal suicides in Iran.²⁰ The most commonly identified negative life events are "loss and conflict" leading towards suicidal behavior involving majority 79% cases of wheat pill poisoning in our study.

As far as outcome of Aluminium phosphide poisoning is concerned; 48(44%) patients out of the total 110 cases of our study those got admitted with acute ALP poisoning, were discharged from the hospital with full recovery while 62(56%) lost their lives inspite of all the possible resuscitative measures. These findings are consistent with those of a study conducted by Khan et al²¹ in Lahore, reporting the mortality rate 70% resulting from acute ALP poisoning whereas the higher mortality rate upto 90% was reported by Iftikhar et al²² in their study about clinical characteristics & outcome of the wheat pill poisoning. The lethal dose of ALP is reported to be 0.5 Grams²⁰ and there are remote chances of survival after ingestion of more than 1.5 Grams of this fatal substance. However, the gastric lavage with potassium permanganate and coconut oil have the useful effects but still debatable. The role of magnesium replacement, digoxin as well as the use of dopamine in low doses and N-acetylcysteine (NAC) are said to reduce the mortality of acute Aluminium phosphide poisoning. But the patients with acute ALP poisoning have very poor prognosis & high mortality as no antidote is available for this poison.

CONCLUSION

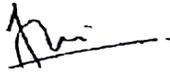
Aluminium Phosphide is frequently used poison with suicidal intent especially in the younger population. Shock / Tachycardia were the most frequent clinical presentation of the patients. Mortality rate was higher in Aluminium Phosphide poisoning inspite of all resuscitative measures. No antidote is available so far whereas role of magnesium sulphate and coconut oil are controversial. Proper legislation is required for strict control on the sale of Aluminium Phosphide. Further research is required to find out the effective antidote in order to reduce mortality because of Aluminium phosphide poisoning.

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