

A Clinical Study of Aluminium Phosphide Poisoning

S. K. Gupta, Annil Mahajan, Vijay Verma, Ajay Gupta

Abstract

The present prospective study of 56 cases of Aluminium Phosphide (ALP) poisoning in Govt. Medical College Hospital Jammu, found out the prevalence of Deliberate self-poisoning self (DSP and accidental ingestion in young population in age group of 16-30 years. Male-female ratio was 1.03:1.00; having marital discord and family quarrels as prominent predisposing factors. The majority of patients had gastrointestinal (GIT) symptoms (73.2%), cardiac arrhythmias (62.5%) and shock (53.3%). The commonest electrocardiographic (ECG) abnormalities were tachycardia (96%), atrial fibrillation (58%) and ventricular-ectopic (VE) beats (59%). The management was supportive in the form of stomach wash, intravenous (I/V) fluids, dopamine, hydrocortisone, sodabarbonate and assisted ventilation in intensive care unit (ICU) setting and mortality rate was 75%. The fatal dose was 300 to 600 mg and fatal period as 2 to 16 hours.

Key Words

Deliberate self-poisoning, Phosphine, Shock

Introduction

Use of ALP as grain fumigant for bulk shipment of wheat led to isolated fatal inhalational exposure to phosphine in stray reports of accidental ALP toxicity in labourers engaged in loading of wheat on ships (1). Washington State's five year experience (1992-1996) reports ALP exposure as inhalational or ocular linked to fumigate shipping containers when later were opened or improper disposal of ALP at a warehouse, to fumigate grain towers or hay trucks in handlers and applicators of ALP (2,3). No reports are available in English literature from any part of the world where ALP has been ingested as a poison for committing suicide except in

Morocco (1995) where recently death rate from suicide due to self administration of ALP pills (Phostoxin) is high (4) and in Denmark (1996) a case of ALP ingestion has been reported. During the last two decades poisoning due to ALP ingestion has been reported (5) widely from different Northern States of India where the ALP poisoning was unknown before 1980. First case was reported in 1981 but since then, the number of cases is progressively increasing throughout the North so much so that it is now the single most suicidal method and problem has acquired an epidemic proportion (6,7,8).

From the Department of Internal Medicine, Government Medical College, Jammu (J&K) India.

Correspondence to : Dr. S. K. Gupta, Consultant Neurologist, 718-A, Gandhi Nagar, Jammu-180004 (J&K) India.

ALP poisoning has been taking a heavy toll of young lives in Jammu also as in other parts of country, for the last 2 decades. The present study was undertaken to find out the clinical and mortality profiles of such patients in Govt. Medical College Hospital, Jammu.

Materials and Methods

In this prospective study, 56 cases of ALP poisoning admitted to Govt. Medical College Hospital Jammu during the period from 1997 to 2001 were included. The diagnosis was based on the authentic history of ingestion of ALP, remnant of ALP tablets or containers left in the house after ingestion and clinical manifestations.

Details of history, clinical examination, investigations, treatment and course of illness was recorded.

Aims and Objectives

The purpose of this study was to find out the predisposing factors, clinical manifestations, ECG abnormalities, dose of ALP consumed and mortality profile of poisoned patients with existing modalities of management.

Observations and Analysis

1. Age and Sex Distribution is shown in Table 1.

Table 1. Age and Sex Distribution in ALP-Poisoning

Group	Total No. of Patients			
	N=56			
Age in Year	Male	Female	Total	%
16-20	17	14	31	55.3
21-25	6	7	13	23.2
26-30	7	5	12	21.5

2. Predisposing Factors

In order of occurrence, marital discord, family quarrels, failure in examination, depression and frustration, economic hardships were prevalent in 20, 16, 8, 7, 5 cases respectively.

3. Mode of poisoning

It was deliberate self poisoning (DSP) in 60% of patients and accidental in 40%.

4. Mortality

Out of 56 cases 42 died leading to a mortality rate of 75%.

5. Time Intervals

The average time interval between ALP intake and admission in hospital in survivors was 2 hours. The fatal period in non-survivors was 2 to 16 hours.

6. Dose of ALP Consumed

In survivors it was 150 mg to 300 mg in comparison to 300 mg to 600 mg in non survivors (fatal dose)

7. Clinical Manifestations are depicted in Table 2.

Table 2. Clinical Manifestation of ALP Poisoning

Clinical Manifestations	Total No. of Patients	%
	N=56	
GIT symptoms	41	73.2
UGI Bleeding	35	62.5
Cardiac Arrhythmias	35	62.5
Shock	30	53.5
ARF	18	32.1
CNS Features	18	32.1
ARDS	11	19.6
Jaundice	5	8.9
Bleeding Diathesis	2	3.5

Most of the patients presented with more than one manifestation.

8. ECG Abnormalities (50%)

In 14 survivors, the tachycardia and occasional VE beats persisted for 3 to 5 days and ST segment changes for 7 to 10 days. Table 3 shows the ECG abnormalities observed in ALP poisoning.

Table 3. ECG Abnormalities in ALP Poisoning

ECG Abnormalities	Total No. of patients	Percentage
Tachycardia	48	96
Atrial Fibrillation	29	58
VE Beats	27	54
ST Elevation	25	50
ST Depression	15	30
A.V. Block	6	12

Management

The supportive management was instituted in the form immediate stomach wash, I/V fluids, dopamine, hydrocortisone, oxygen inhalation, sodabarbonate and assisted ventilation in ICU setting.

Discussion

Acute ALP poisoning accidental or deliberate self poisoning is a world wide problem. Except in India, Morocco (4) and Denmark (5) nowhere in the world ALP is ingested for self poisoning. During the last two decades, there has been an upsurge of ALP poisoning in North States of India. With green revolution and industrialisation the ALP has become a common household item and in view of high mortality the problem needs to be tackled with a multi-faceted strategy.

According to a study by Siwach, *et. al.* (9), the majority of ALP poisoning patients were young (78%) and peak incidence was seen in age group 21-30 years, the male outnumbered the female (almost doubled); marital disharmony and economic hardship were the two important predisposing factors and 91.4% of cases were of self poisoning with mortality rate of 67.6%. In comparison, the present study showed 100% of young patients in age groups of 16 to 30 with male-female ratio of 1.03 : 1.00, the male marginally dominating the female; marital discord and quarrels in the family being two predisposing factors in order of occurrence; 60% of patients of deliberate self poisoning and 40% of accidental ingestion, with a mortality rate of 75%.

The main clinical manifestation reported in literature comprise of cardiovascular system (60-100%) including shock and cardiac arrhythmias as prominent features. (8,10) The present study had in comparison GIT symptoms (73.2%) cardiac arrhythmias (62.5%) and shock 53.5%. The muscle involvement was not seen in this study.

The ECG abnormalities have been reported in 80% of cases (with ST-T changes in 40%). (11) In comparison, the present study observed such abnormalities in 50% of cases (with tachycardia in 96%)

As compared to the reported fatal dose of 150 to 500 mg and fatal period of 1 to 96 hours after ALP ingestion (11), the present study showed the fatal dose as 300 mg to 600 mg, with fatal period as 2-16 hours.

The mortality due to ALP poisoning is very high and variable and depends upon a number of factors, the lack of antidote and the bad prognostic signs being the most prominent. With supportive management the mortality reported is 70 to 100% (12-14). In comparison, the present study observed it as 75% with the said modality of management in the young patients having marital discord and quarrels in the family and presenting predominantly with GIT symptoms, cardiac arrhythmias and shock.

One most important factor which shall help to improve survival is providing preliminary medical-aid within half to one hour of ALP intake at grass root levels. Other preventive measures are the caging of tablets in plastic in packs with holes and spikes and more stringent restrictions on its supply in open market. The applicators of ALP must be licensed or working under the supervision of a licensed person. Improved education and enforcement of safety regulations would help to improve the frequency of the illness. Thus, the problem needs to be tackled by using multi-faceted approach in the form of preventive measures, updating the management modalities at all levels and over all a study and research for antidote which will prevent further loss of human lives as a result of poisoning.

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