Mortality Indicators of Aluminium Phosphide Poisoning: Experience at DHQ Hospital Rawalpindi

ABSTRACT

Objective: To note the association of gender, age, time interval between poisoning and hospital presentation, number of pills ingested, at presentation shock and use of pills from freshly opened container with mortality in ALP (wheat pill) poisoning.

Materials and Methods: In this cross-sectional observational study patients managed with diagnosis of wheat pill poisoning at DHQ Hospital, Rawalpindi were included consecutively. Age, gender, time interval between poisoning and hospital presentation, number of pills taken, poisoning from a freshly opened container or not, shock at presentation or not, were noted in addition to the outcome (alive or expired). Chi-square and t test were used as test of significance.

Results: Forty six patients were included in the study. Mean patient age was 25.67±8.69 years. 52% (n=24) patients expired. Significantly higher mortality was noted in males (p value 0.04), patients who took pills from freshly opened container (p value <0.001) and patients who had shock at hospital presentation (p value <0.001). Age, number of pills taken, and time elapsed between poisoning and hospital presentation did not affect mortality significantly.

Conclusion: Male gender, poisoning from freshly opened container of ALP pills, and shock at hospital presentation are indicators of poor outcome in ALP poisoning patients.

Key words: Poisoning, Aluminum phosphide, Mortality

Introduction

Poisoning with different substances and compounds is noted all over the world. Pesticide poisoning is very common in agricultural countries.1 Pesticide poisoning can be intentional and accidental. It is associated with high mortality.1 Organophosphate compounds, and Aluminum Phoshide (ALP) are two most important pesticides used for poisoning.2 Aluminum phosphate is commonly used as a wheat pill or rice tablet to preserve stored grains in Asia.2,3 It is a highly effective insecticide and is fatal for human beings if ingested.4 When ALP comes in contact with moisture, phosphine gas is released which is rapidly absorbed from mucosal surfaces.5 Phosphine leads to cellular hypoxia and circulatory failure by inhibiting oxidative phosphorylation.6 It affects cardiovascular, gastrointestinal, respiratory and nervous system. Death results in ALP poisoning due to arrhythmia, refractory hypotension, hepatic and or renal failure.7 Occupational exposure to phosphine gas has been reported in labourers while loading wheat on ships, when ALP was used as fumigant.8 ALP is frequently used as poison for suicidal attempts in agricultural countries.2 30 to 100% mortality has been noted in ALP poisoning.7 Clinical features and mortality relating to ALP poisoning has been focused in various Pakistani studies. At our hospital, patients with ALP poisoning are frequently managed. Knowing mortality indicators in ALP poisoning...
can help in better management of affected patients. This study was planned to note the association of age, gender, time interval between poisoning and hospital presentation, number of pills ingested, use of pills from freshly opened container, and at presentation shock with mortality in ALP poisoning patients managed at our hospital.

### Materials and Methods

This cross-sectional, observational study was conducted at Department of Medicine, District Headquarter Hospital, Rawalpindi from May 2014 to December 2014. Patients managed with diagnosis of ALP poisoning based on history and clinical findings were included consecutively after informed consent from the patient or his close relative where ever relevant. Approval in this regard was taken from Departmental Ethical Committee. Each patient was managed in standard way for wheat pill poisoning i.e., gastric lavage with edible oil, activated charcoal ingestion, magnesium sulfate administration, Intensive Care Unit(ICU) admission, and amiodarone therapy where ever relevant. End point of the study was either death or discharge from the hospital. We noted 1) age, 2) gender, 3) time interval between poisoning and hospital presentation, 4) number of tablets taken by the patient, 5) did the patient take pills from a freshly opened container or not. 34.8% (n=16) patients presented with shock and 65.2% (n=30) patients were hemodynamically stable at presentation.

Outcome based comparison of patients, focusing age, gender, time elapsed between poisoning and hospital presentation, number of pills ingested, whether or not patients took pills from freshly opened container, and whether or not patient presented with shock are detailed in Table I. 75% (n=18) males and 59% (n=13) females took pills from freshly opened container.

### Results

Forty six patients were included in the study. Mean patient age was 25.67±8.69 years. 52% (n=24) patients were male and the rest female. Mean time interval between poisoning and hospital presentation was 4.64±1.84 hours. In 17.4 % (n=8) patients time interval between poisoning and hospital presentation was less than 2.5 hours. In 76 % (n=35) patients this interval was more than 2.5 hours. In 6.5% (n= 3) patients time interval between poisoning and hospital presentation was not known. 45.6% (n=21) patients took ≤1 ALP tablet, 52% (24) patients took ≥2 tablets for this purpose, 2.1% (n=1) patients were not sure about number of pills taken. 63% (n=29) patients took poison from a freshly opened container while 32.6% (n=15) did not. In 4.3% (n=2) patients it was not sure whether they took pills from freshly opened container or not. 34.8% (n=16) patients presented with shock and 65.2% (n=30) patients were hemodynamically stable at presentation.

### Discussion

Mortality in our ALP poisoning patients was significantly associated with gender, pills taken from a freshly opened container, and shock at the time of presentation to hospital. Although we also focused on age, number of pills taken for poisoning and poisoning to hospital presentation time interval, significant association was not noted in this regard.

In studies focusing ALP poisoning, 30-100% mortality has been noted. In a Study conducted at Morocco, 49% mortality was noted. In a Pakistani study 33% mortality was noted. 60% mortality is also noted in some studies. Our results are comparable in this regard. Mortality was high in our male patients compared to females. Such association has not been noted previously. Number of males who took pills from a freshly opened container was also more in our study. Increased mortality in our male patient may be

<table>
<thead>
<tr>
<th>Variables</th>
<th>Outcome</th>
<th>p-Value</th>
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<tbody>
<tr>
<td></td>
<td>Death</td>
<td>Discharge</td>
</tr>
<tr>
<td>Age</td>
<td>&lt; 20 years</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>≥20 years</td>
<td>17</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>16</td>
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<tr>
<td></td>
<td>Female</td>
<td>8</td>
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<tr>
<td>Number of Pills</td>
<td>One or less</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Two or more</td>
<td>13</td>
</tr>
<tr>
<td>Time elapsed</td>
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<td></td>
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<tr>
<td>Container freshly opened</td>
<td>Yes</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Shock at presentation</td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>No</td>
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</tbody>
</table>
because of potency of the poison as it was taken from freshly opened container.

Association between age and outcome has not been found in studies conducted on ALP patients. We noted similarly. Studies have shown that time interval between poisoning and hospital presentation has significant influence on outcome in ALP poisoning. In some studies however no association has been noted between such time period and mortality. This is what we noted in our study also. Many studies have shown that number of pills or dose of the poison significantly affects mortality in ALP poisoning. In an Indian study however no association was noted between number of pills ingested and mortality. We also did not find such association.

Studies have shown that use of ALP pills from a freshly opened container has higher mortality. Jaiswal S et al noted 56% mortality in patients taking pills from freshly opened container versus no mortality in patients taking pills from an already opened exposed container. We noted similarly. Low mortality from already opened, exposed pills is probably due to moisture exposure in air and release of phosphine gas making these pills less toxic.

Shock in ALP poisoning is due to toxic effect on cardiovascular system which indicates that chance of survival decreases if there is early cardiac involvement. Shock at presentation was found an important indicator of mortality in ALP poisoning in our study. Similar findings had been noted in other studies also. 70.8% mortality was noted in patients presenting with shock compared to 20% who presented without shock in a study conducted by Louriz M et al.

**Conclusion**

Fifty two percent of our ALP poisoning patients expired. Male gender, poisoning from freshly opened container of ALP wheat pills, and shock at hospital presentation were associated with poor outcome. Age, number of pills taken, and time elapsed between poisoning and hospital presentation did not affect mortality significantly.

**References**