

Study Clinical Symptoms and Para-Clinical Findings in Poisoning Patient with Aluminum Phosphide in Patients Referred to Imam Khomeini Hospital in Ardabil (Northwest of Iran)

Farzaneh E¹, Mostafazadeh B², Naslseraji F³, Shafaiee Y⁴, Ghobadi H⁵, Amani F^{6*}

¹ Department of Forensic Medicine and Toxicology, Ardabil University of Medical Sciences, Ardabil, Iran

² Department of Forensic Medicine and Toxicology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³ Department of Gynecology and Obstetrics, Ardabil University of Medical Sciences, Ardabil, Iran

⁴ Department of Surgery, Iran University of Medical Science, Tehran, Iran

⁵ Department of Internal Medicine (Pulmonary Division), Ardabil University of Medical Sciences, Ardabil, Iran

⁶ Department of Community Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

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ABSTRACT

Background: Aluminum phosphide is used in different area in Iran. According to that the herbal form of these pills are used increasingly, comparison and evaluation of these patients in terms of clinical and laboratory symptoms are important. We studied on clinical and Para-clinical findings in patients who had taken aluminum phosphide and its herbal form in this study.

Methods: This is a descriptive and analytic study which carried out during 2006-2012. In this study, laboratory variables, white blood cell count, hematocrit, blood glucose, sodium, potassium and bicarbonate, arterial blood gas also clinical finding after taking aluminum phosphide pills, and vital signs of poisoned patients were extracted.

Results: In this study 386 poisoned patients were evaluated. We divided poisoned patients in two groups, case and herbal. 35% had been taking original Aluminum phosphide (case group) and 65% herbal form (herbal group). In totally 18.7% of poisoned patients were male. The average age of patients in herbal group was 23.22 ± 8.20 years and in case group was 24.78 ± 7.04 years. In both groups, nausea and vomiting were the most prevalent clinical signs. Experiments in a separate group showed significant different in blood pressure upper ($P < 0.001$), Po₂ level lower ($P < 0.001$), pH lower ($P < 0.001$) and bicarbonate lower ($P < 0.001$) but there was no significant difference in respiratory rate, temperature, hemoglobin level and hematocrit. Also was observed that 70.4% of patients in case group died but all patients in herbal group survived ($P < 0.001$).

Conclusion: The results of this study indicated that arterial blood gas of patients is a useful tool for differentiating oral poisoning with original and herbal rice pill. Hence, in patients with clinical toxicity of rice tablet can be used to differentiate these two tablets.

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► *Implication for health policy/practice/research/medical education:* Clinical Symptoms and Para-Clinical Findings in Poisoning Patient with Aluminum Phosphide

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1. Introduction:

Drug overdose or intoxication, intentionally or accidentally, is one of the frequent causes of hospitalization. However, rates of drug overdose in different countries are greatly different. During recent decades, a significant increase in hospital admissions due to drug overdose has been reported, across the world. A major proportion of these poisoned patients are following completed suicides and parasuicides (1).

There are two kinds of pesticide which are used to protect grains and rice from pests and rodents in household which are known as rice tablet. One of them is an herbal product and poisoning of them, is not dangerous but the other one is Aluminum phosphide (AIP) which is dangerous (2).

Aluminum phosphide poisoning (ALPP) is common in Asia, especially in India, Jordan, Morocco and Iran. In parallel with its accidental ingestion, it has been used frequently as a suicidal agent as well (3). Aluminum phosphide or pellets of rice is one of the most common pesticides and insecticides which are used in agriculture to protect crops, cereals and rice.

Aluminum phosphide (AIP) is used frequently as fumigant and rodenticide due to its low price, easy application, and high efficacy (4). Use of Aluminum phosphide in our country specially in north areas of country, where called as pellets of rice, are used for storage of rice and other grains in warehouses and prevent the destructive impact of vermin which due to low price, the potential toxicity and more availability causes to incidence of acute poisoning and ultimately death. However recently, efforts to reduce production, prohibitions and

restrictions on their sale, but the upper statistics because of its toxicity, especially in the Northern provinces (Gilan and Mazandaran) indicates the necessity of dealing with this problem is more serious (5).

In recent years, the prevalence use of rice pills to commit suicide has been increased sometimes accidentally as a result of occupational exposure and in sometimes for crime occurs (1, 5-7).

Most of toxicities occurred at the age group 20-30 years and many social, geographical, mental factors and also simple availability (5, 6).

In Tehran study, toxicity with rice pills was 8% among all toxicities and about 12% of all mortalities related to death by rice pills (7).

Annually about 300000 deaths are reported by pesticides poisoning worldwide and the most reports of acute pesticide poisoning only based on hospital records admission and as a result absolutely reflect a small part of the real incidence. In Asian region about 25 million agricultural workers suffer from an episode of poisoning each year.

In "phosphine" poisonings reported from Germany, 28% were planned and mostly by eating, whereas the majority of them (65%) accidental exposures were by inhalation. A report has also been published from the United Kingdom where the majority of 93 aluminum phosphide exposures were accidental and concerned inhalation of phosphine in agricultural locations (8). Khodabandeh and *et al* in a study showed that multiple drug toxicity and opioid poisoning were the most common causes of acute poisoning death in 27.5% and 27.1% respectively (9).

According to importance of subject and difference pattern of treatment toxic patients, the aim of this study was compare the clinical and Para-clinical symptoms in toxicity with main rice pill (Aluminum phosphide) and plant rice pill.

Corresponding author: Amani F, PhD. Associate Professor, Department of Community Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
E-mail: f.amani@arums.ac.ir

2. Materials and Methods:

This was a descriptive cross-sectional study and the research area was emergency section of Imam Khomeini hospital in Ardabil (northwest of Iran). The samples were 386 of patients that poisoned by rice pills during 2006-2012.

Data collected by a checklist included variables such as White blood cells (WBC), HCT, arterial blood gas (ABG), FBS, Sodium (Na), phosphorus (P) and clinical results such as nausea, vomiting follow the uses rice pills and vital signs. Collected data analyzed by statistical methods such as table, graph and t-test in SPSS.19. The significant level was set at $P < 0.05$.

3. Results:

Of all cases, 18.7% were male and rest of them was female. There wasn't significant difference between two groups by sex.

The mean age of patients in case (original) group with 23.2 ± 8.2 was similar to herbal group with 24.7 ± 7.1 and most patients were in age group which lower than 20 with (44.8%). In all patients the rice pills was used by orally and 91.5% use it deliberately. In case group 60.3% and in herbal group 66.4% has vomiting after use. Also we had seen that the nausea and vomiting are the most prevalent clinical symptoms in all patients (Figure 1).

Results showed that the patients in case group significantly have lower BP and PR than herbal group ($P=0.001$, $P=0.007$) (Table 1).

There was not any difference in HCT and Hb between two groups. In case group the Na and Po level was significantly lower ($P=0.001$) and the FBS level ($P=0.001$) was upper than control group (Table 2).

There was not any significant difference in BUN and Cr between two group and the levels of PO₂ ($P=0.001$), pH ($P=0.001$) and Bicarbonat ($P=0.001$) in case group was significantly lower than control group (Table 3).

The heart signs were seen in 80% of all patients in two groups. The most heart sign in two groups was ST changes (ST goes up and low) which was seen in 39.8% of case

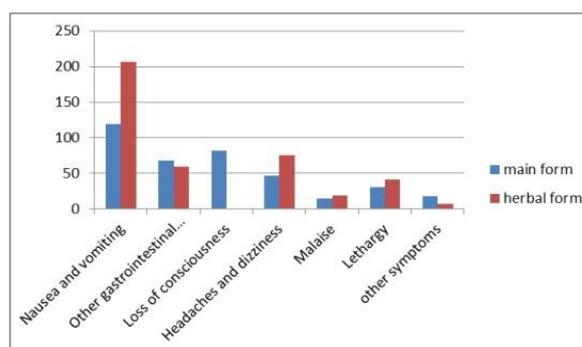


Fig. 1. It shows the frequency of patients by clinical symptoms.

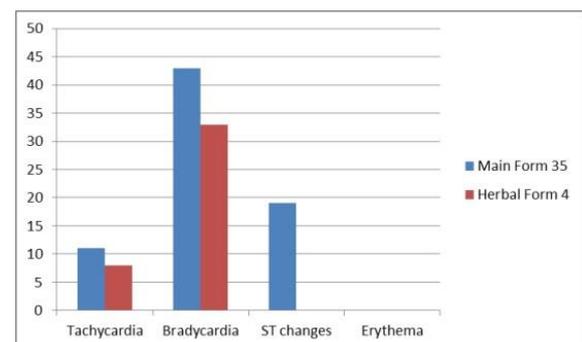


Fig. 2. It shows the frequency of patients by ECG finding.

group and 73.3% of control group (Figure 2).

In case group 95 patients (70.4%) have died and all of patients in control group were live and the death rate was significantly difference between two groups. The mean time of hospitalization in case group was 3.2

Table 1: The mean of vital signs in patients by from of pill

Vital signs	Group	mean±SD	P value
BP	Original	80.9±14.6	<0.001
	Herbal	101±21	
Pulse rate	Original	94.3±18.2	0.007
	Herbal	73.2±17.4	
RR	Original	18.7±3.6	0.26
	Herbal	17.3±2.8	
Fever	Original	36.3±0.7	0.49
	Herbal	36.7±0.9	

Table 2: The mean of BS, Na and Po in patients by two groups

Vital signs	Group	mean±SD	P value
Na	Original	132.5±9.2	<0.001
	Herbal	142.3±13.5	
Po	Original	3.75±0.4	0.001
	Herbal	3.97±0.3	
FBS	Original	133.1±31.1	0.26
	Herbal	110.8±29.7	

Table 3: The mean of ABG results in patients in two groups

Vital signs	Group	mean±SD	P value
Po2	Original	65.9±48.3	<0.001
	Herbal	82.2±46.1	
PH	Original	7.2±0.1	<0.001
	Herbal	7.4±0.1	
Pco2	Original	35.2±17.6	0.71
	Herbal	34.7±9.4	
Hco3	Original	14.3±5.2	<0.001
	Herbal	22.3±6.2	

and in control group was 3.6 and the difference wasn't significant between two groups.

4. Discussion:

Our finding showed that, sex distribution and ratio in our study was similar to other studies. The prevalence of toxicity in other studies in male was upper than female but our study finding was similar to some studies (10-12) and not similar to some studies (13-15).

In our study, the mean age of patients in case group was 23.2±8.2 and in control group was 24.7±7.1. In compare with other studies in Iran and other countries the result was similar to our study finding (10-15).

The ST changes in our study was the prevalent heart signs and in compare with other studies observed that patients taking the pill's main rice have clear acidosis along with a low level of sodium, potassium and higher level of glucose towards to the group taking the herbal pill which was related to ineffective herbal pills in human body.

Results showed that 70.4% of patients in our study in case group were died which in compare to other studies it was upper that should be noted that the reason for die of patients in case group, can be probably due to old or incorrect use of the pills (10-11,16-19).

5. Conclusion:

Results showed that ABG in patients is a useful tool for distinguishing poisoning by the Aluminum phosphide and herbal pills. It was recommended that we must do better and exactly retrospective studies in future about form of rice pills.

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