Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

ROLE OF ARTERIAL BLOOD GAS ANALYSIS AND SERUM CHOLINESTERASE LEVELS IN PREDICTING OUTCOME OF ACUTE ORGANOPHOSPHORUS POISONING

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Abstract

Introduction: There are 3 million acute pesticide poisoning incidents and 3 lakh annual deaths in Asia. Pesticides called organophosphorus compounds are widely utilised, but they pose a serious risk to people because they can be consumed by those trying to kill themselves, inhaled accidentally, or sprayed directly onto skin. Pesticides can be used as biological agents in chemical warfare. Around 60% of self-harm in our nation is done with the intention of poisoning oneself. Most of the time, organophosphorus chemicals account for about 80% of all pesticide toxicity. When determining the prognosis of patients with acute organophosphorus poisoning, ABG measurement is extremely important. Therefore, predictive prognostic features would be helpful for the physicians to stratify the patients according to their likelihood of deterioration. Early identification and vigorous care are frequently lifesaving measures. For patients admitted with OPC poisoning, a variety of clinical and laboratory markers have been utilised to gauge the severity of the poisoning and forecast clinical outcomes like Peradeniya Organophosphorus Poisoning Scale (POPS). To gauge the severity of OP intoxication [1,2]. It was developed by N Senanayake, HJ de Silva, and L Keralliceede at the University of Peradeniya in Sri Lanka. It is a scale that integrates five typical OP poisoning factors (pulse rate, respiratory rate, pupil size, fasciculations, level of consciousness, and seizure activity. 2 Every parameter of POP scale is given score of 0-2 at the time of initial presentation[2] . As a result, my research focuses on the relationship between arterial blood gas analysis and serum cholinesterase levels in predicting the prognosis of patients with organophosphorus poisoning as well as the correlation between these variables and the clinical severity Peradeniya organophosphorus poisoning(POP) scale.

Aim:

To estimate the role of arterial blood gas analysis and serum cholinesterase levels in predicting outcome of acute organophosphorus poisoning.

Objectives:

1.To categorise clinically the severity of OP compound poisoning from the day of admission till discharge by Peradeniya Organophosphorus poisoning (POP) severity scale.
2.To correlate clinical severity POP scoring with ABG (Arterial Blood Gas) analysis and serum cholinesterase levels from admission till discharge.
3.To correlate clinical severity with Atropine requirement, duration of ventilation and hospital stay days.
4.To correlate ABG (Arterial Blood Gas) analysis with complications like respiratory failure, need for mechanical ventilation, intermediate syndrome (IMS)

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Study design: CROSS SECTIONAL OBSERVATIONAL STUDY DESIGN.

Study setting: All patients were prospectively enrolled from the CCU and General Medicine Department at Government General Hospital, Kadapa.

Study subjects: 50 patients with clinical evidence of op compound poisoning were enrolled in this study. Informed consent was taken from all patients.

Sample size: 50

Study period: MARCH 2022 to APRIL 2023.

Inclusion criteria:

1. Patients >12 years of age who have consumed organophosphorus compound poison.
2. Admitted within 24 hours irrespective of route of exposure.

Exclusion criteria:

1. Other pesticide poisoning.
2. Other comorbities causing acid base disturbances like end stage renal disease, Chronic lung disease, diabetes causing acidosis.
3. Mixed poisoning.
4. Consumption of poison with alcohol.

PROCEDURE:

A questionnaire prepared noted the detailed collection of poison content, quantity and time of presentation after consumption. History of vomitings, salivation, lacrimation, urination, seizures loss of consciousness and blurring of vision were asked. All previous clinical records of the patients were analyzed in detail.

Based on the pupil size, respiratory rate, heart rate, fasciculation and level of consiousness, Patients are assigned pop score accordingly.

ABGA (arterial blood gas analysis) was done in the General medicine department of Government General Hospital for all patients. Complete blood count, blood glucose (fasting and 2 hours postprandial), Fasting lipid profile, blood urea, serum creatinine, and serum electrolytes were measured in all patients. Seum cholinesterase levels were also measured.

Serial repetitions of ABGA and cholinesterase levels are done on day 1 ,2, 3 and on day of discharge

Ethical clearance: Before collection of data, all subjects were briefed about the purpose of the study and written informed consent was obtained. All investigations were done free of cost and no financial burden imposed on the patient. Ethical clearance was obtained from the institutional ethics committee.

Statistical analysis: Data Entry was made using Microsoft excel (MS-Excel) 2013 and analysis has been done with the help of SPSS V 16. Qualitative data was expressed in frequencies and percentages and Quantitative data in mean and standard deviation. Parametric tests include ANOVA test was used for intergroup comparison. p value of <0.05 was considered statistically significant.

Results:

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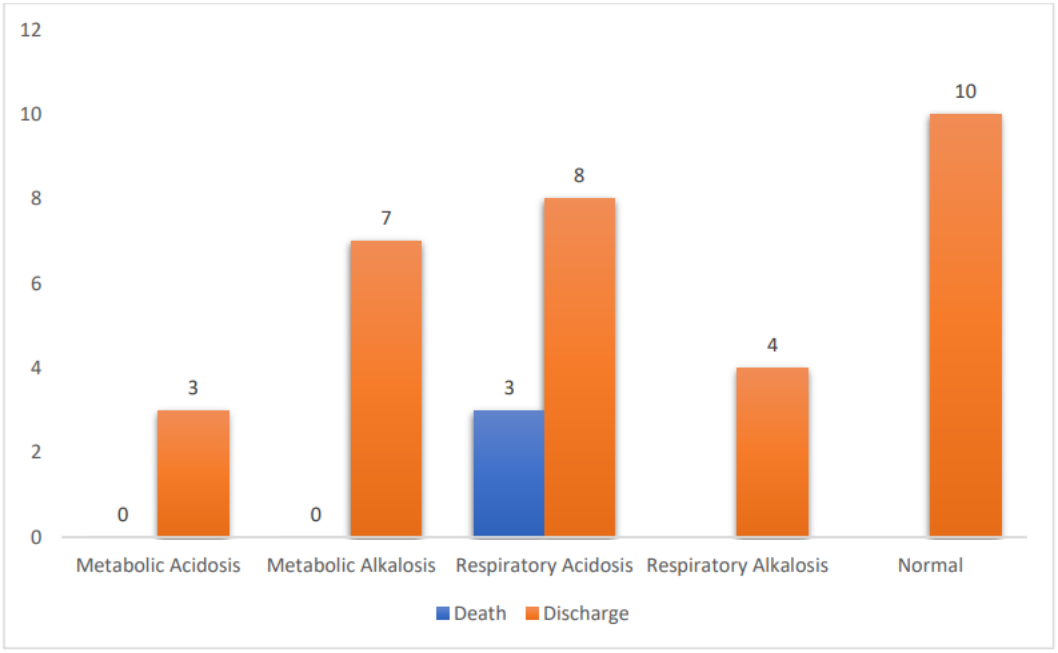
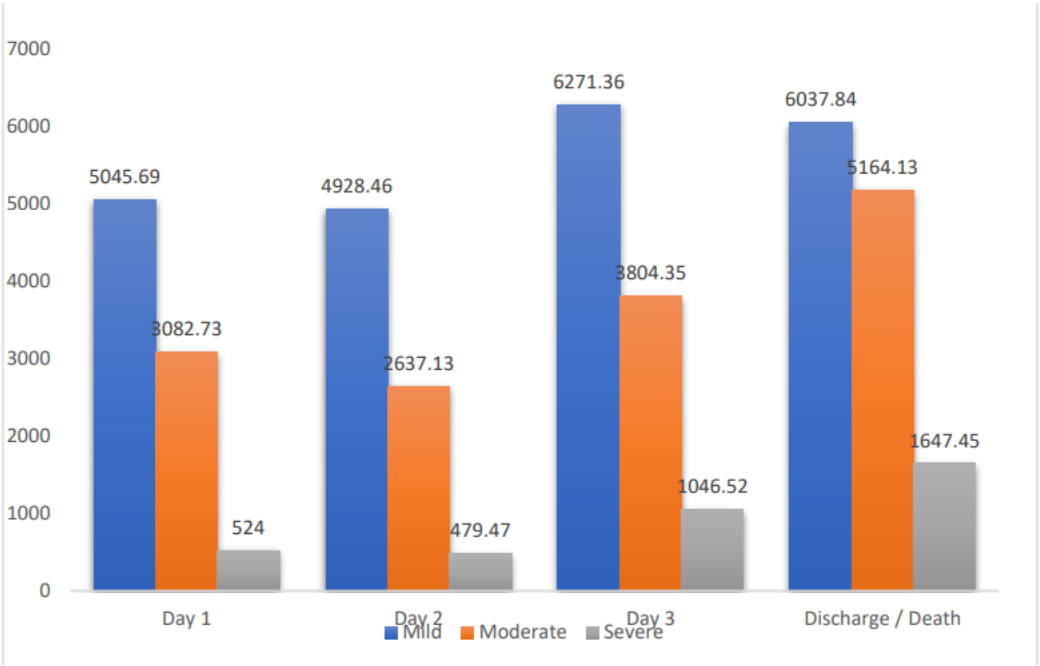


ABGA AND OUTCOME ANALYSIS



ACETYLCHOLINESTERASE LEVELS AND SEVERITY CORRELATION

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Discussion:

Acute organophosphorus poisoning is one of the most common poisonings encountered in Government Medical college (GMC) and Government General Hospital (GGH), Kadapa. In our study 50 patients who satisfied the inclusion and exclusion criteria with regard to Organophosphorus poisoning were included. The diagnosis of OP(Organophosphorus) compound poisoning is made based on the patient's history, clinical presentation, and laboratory investigations. In a patient with a history of organophosphorus poisoning, a particular odour can be noted. With the presence of typical symptoms, and reduced erythrocyte and plasma cholinesterase levels, the diagnosis of organophosphorus poisoning is not difficult to make. Unfortunately, history is frequently out of reach. Furthermore, if the patient exhibits symptoms like heart block, diarrhoea, seizures, or ketoacidosis, for example, the clinical signs of OP poisoning might not be identified as such. The first step to a precise diagnosis is being aware of this variety of presentation.

From Karachi, Pyar Ali et al [3] found the mean age group of 28.6 ±9.8 years

The average age group, according to Turkish researchers Murat Sungur et al [4], was 30 ±15 years.

According to Malik et al [5]. from Kashmir, the majority of those affected were under the age of 25.

In a study conducted by Reihman et al [6] 70% of the cases were in the age group of 15 to 25 years. 86.4% of the cases were in the age group of 12-30 years in a study conducted by Goel et al [7] .

In comparison to our study,Doshi et al [8] study group also had majority of the cases in the age group 21 to 30 years.

In Banday et al [9] study, majority (66%) were in the age group 21-40 years.

The mean age was recorded as 25.5 years by Kolkata researchers KuntalBattacharyya et al.[10] B

Male predominance was observed in the sex distribution of the 165 cases of organophosphorus compound poisoning reported by S.Shivakumar and K.Raghavan et al.[11] of Tamilnadu.

In contrast to our study,Malik et al[35] observation of 122 cases in the Kashmir valley (females n=114, men n=50).

A male predominance was revealed by KuntalBattacharya et al [10]. study from Kolkata

one study was done by M.Vishwanathan et al45 which showed that majority of patients were females(66%).

In our study, 30% of the cases (15 out of 50) were farmers. Organophosphorus chemicals had a higher exposure among non-agriculturists with a suicidal intent.

Most common route of administration was the oral ingestion. This finding was same as in the studies by Ravi et al, M Eddleston et al [12], Study by Tanveer Hassan et al31 which showed (98.5%) patients ingested the compound While only two patients (1.5%) had dermal/inhaled exposure while spraying pesticides in rice fields.

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A study conducted by Yuri Gagarin et al [13] showed that most commonly consumed Organophosphorus compound in their study was Methyl parathion (27%), followed by chlorpyrifos (22%)

In this study 13 cases (26%) belong to mild category,15 cases (30%) belong to moderate category and 22 cases (44%) belongs to severe category.

In a study conducted by Brinda et al [13] ,72% belong to mild category,25.3% belong to Moderate category,2.77% belonged to severe category

The mean serial cholinesterase levels and the clinical severity POP scoring show a strong association from admission until discharge or death, patients with severe POP score had lower mean cholinesterase levels.

As the clinical severity increases, the dose requirement of atropine also increases. Thus, there is a positive correlation between atropine dose requirement and the clinical severity.

In this study, the mean dose of atropine requirement is 3.53 for mild cases,12.86 for moderate cases and 21.90 for the severe category cases.

In this study out of 50 cases,15 cases (30%) landed in intermediate syndrome. Out of these 15 cases,11 cases belong to the severe category and 4 cases belong to moderate category.

In this study, out of 13 Mild cases, all of them got discharged while out of 15 moderate cases all of them got discharged. But out of 22 severe cases,18 cases were succumbed to death and 4 got discharged. The total mortality is 36% among the 50 cases.

Out of these 15 cases of intermediate syndrome,8 had Respiratory Alkalosis and 7 had Respiratory Acidosis.

In this study,27 cases (54%) had got the requirement of ventilator support. Out of these 27 cases,17 of them had Respiratory Alkalosis and 9 had Respiratory Acidosis

In this study, out of 19 cases with Respiratory Alkalosis,15 cases succumbed to death while 4 got discharged and out of 11 Respiratory acidosis cases,3 died and 8 got discharged. 7 cases had Metabolic Alkalosis and all of them recovered and got discharged.3 cases had Metabolic Acidosis and all 3 of them recovered and got discharged.

Conclusion:

1. A much-needed clinical evaluation tool to classify the severity of instances of acute organophosphorus poisoning is the Peradeniya Organophosphorus Poisoning Scale.

2. Various studies have demonstrated the need for aggressive therapy based on the correlation between serum cholinesterase levels and clinical severity scores.

3. Even though it is not widely available in peripheral hospitals, arterial blood gas measurement must be performed to evaluate acid-base abnormalities and provide prompt, appropriate treatment. Since metabolic acidosis can be treated with bicarbonate, respiratory acidosis as well as alkalosis can be managed with mechanical ventilation

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