



## General Medicine

## HYPOKALEMIA IN ORGANOPHOSPHORUS COMPOUND POISONING AND ITS PROGNOSTIC SIGNIFICANCE

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**ABSTRACT** **Context:** Organophosphorus compounds poisoning are one of the most common causes of mortality and morbidity in India. OPC act by inhibiting acetylcholinesterase at muscarinic and nicotinic receptors. Hence, reduction in erythrocyte cholinesterase and plasma cholinesterase levels are seen. and. the most frequent cause of mortality is respiratory arrest and acidosis due to respiratory muscle paralysis. OPC poisoning patients are associated with hypokalemia and may lead to further progressing of the muscle weakness. **Methods and Materials:** 50 Patients of organophosphorus compound poisoning treated in the Department of General Medicine, NRI Medical college are included in the study. most of them are males, and the maximum patients are in the age group of 21 to 30 years, Statistical Analysis: All categorical variables are expressed in percentages. Mean and SDs were calculated for numerical values. Results: The age of the patients ranged from 15 to 75 years. In this study, most of them are males, and the maximum patients are in the age group of 21 to 30 years. Of 50 patients studied, 26 had normal serum potassium levels, and 24 patients had hypokalemia. **Conclusion:** It was concluded from this study that hypokalemia contributes significantly morbidity and mortality in organophosphorus compound poisonings significantly.

**KEYWORDS :** organophosphorous compounds, acetylcholinesterase, hypokalemia

## INTRODUCTION

Organophosphorus compounds have been widely used in agriculture for decades for crop protection and pest control (1). Some highly potent OPC anticholinesterase compounds, including tabun, sarin, soman have been used as "nerve gases" in chemical warfare.

Intentional self-poisoning with pesticides, especially OPC, is a significant public health problem worldwide that causes the death of an estimated 200,000 people annually, and its incidence keeps rising (6). OPC act by inhibiting acetylcholinesterase at muscarinic and nicotinic receptors. Hence, erythrocyte cholinesterase and plasma cholinesterase levels are reduced in OPC poisoning (7). Any reduction in the plasma cholinesterase level usually clinches the diagnosis of acute OPC poisoning (8). Serum cholinesterase can be a valuable tool in the diagnosis of OPC poisoning. But its role in prognostication is very minimal. This study is conducted to assess serum potassium to predict the severity and prognosis in OPC poisoning patients.

## AIMS AND OBJECTIVES:

- 1) To measure serum potassium levels in acute organophosphorus compound poisoning.
- 2) To correlate hypokalemia with various clinical parameters and outcome.
- 3) To analyze the validity of hypokalemia in the prediction of severity and prognosis in OPC poisoning.

## Case study:

This is a Cross-sectional, prospective study conducted at NRI Medical college & hospital with sample size 50.  
Duration Of Study: 18 months from January 2020 to June 2021.

## Inclusion Criteria:

All the OPC poisoning cases confirmed by history, circumstantial evidence of ingestion, admitted in our hospital with characteristic clinical findings and basic laboratory investigations were included in the study.

## Exclusion Criteria:

Patients with the feature of exposure to another compound not relating to OPC Poison.

Patients with mixed poisoning; OPC poisoning and any other poison  
Patients with a history of malignancy  
Patients with a history of renal disease

Patients with a history of cardiac disease

Patients with a history of diuretic use.

Data analysis was done using Microsoft Excel -2019.

## RESULTS:

## 1. age and sex distribution of patients

| Age (in years) | Males (n=39) |            | Females (n=11) |              | Total (n=50) |    |
|----------------|--------------|------------|----------------|--------------|--------------|----|
|                | Number       | % of males | Number         | % of females | Number       | %  |
| <20            | 1            | 2.56       | 1              | 9.09         | 2            | 4  |
| 21-30          | 16           | 41.02      | 6              | 54.54        | 22           | 44 |
| 31-40          | 5            | 12.82      | 3              | 27.27        | 8            | 16 |
| 41-50          | 8            | 20.51      | 1              | 9.09         | 9            | 18 |
| 51-60          | 8            | 20.51      | 0              | 0            | 8            | 16 |
| >60            | 1            | 2.56       | 0              | 0            | 1            | 2  |

## 2. incidence of hypokalemia

| hypokalemia | Frequency | Percent (%) |
|-------------|-----------|-------------|
| Absent      | 26        | 52          |
| present     | 24        | 48          |
| total       | 50        | 100         |

## 3. Clinical manifestations of the patients

| Clinical manifestation        | Number | Per cent (%) |
|-------------------------------|--------|--------------|
| Bronchospasm/bronchorrhea     | 38     | 76           |
| Vomiting                      | 40     | 80           |
| Respiratory distress          | 28     | 56           |
| Abdominal pain                | 15     | 30           |
| Sialorrhea                    | 16     | 32           |
| Fasciculations                | 14     | 28           |
| Diarrhoea                     | 8      | 16           |
| Lacrimation                   | 6      | 12           |
| Conjunctiva Congestion Watery | 37     | 74           |
| Pupil Miosis mydriasis        | 39     | 78           |
|                               | 8      | 16           |

## 4. association of serum potassium and requirement of mechanical ventilation

|                       |             |                | Mechanica ventilation |       | total |
|-----------------------|-------------|----------------|-----------------------|-------|-------|
|                       |             |                | yes                   | no    |       |
| Potassium Derangement | Hypokalemia | Count          | 18                    | 6     | 24    |
|                       |             | Percentage (%) | 75                    | 25    | 100   |
|                       | normal      | Count          | 10                    | 16    | 26    |
|                       |             | Percentage (%) | 38.46                 | 61.53 | 100   |
| Total                 |             | count          | 28                    | 22    | 50    |
|                       |             | Percentage (%) | 56                    | 44    | 100   |

#### 5.association of potassium derangement with mortality

|                       |              |                |          | OUTCOME | total |
|-----------------------|--------------|----------------|----------|---------|-------|
|                       |              |                | survived | death   |       |
| Potassium Derangement | Hypokal emia | Count          | 14       | 10      | 24    |
|                       |              | Percentage (%) | 58.33    | 41.66   | 100   |
|                       | normal       | Count          | 22       | 4       | 26    |
| Total                 |              | Percentage (%) | 84.61    | 15.38   | 100   |
|                       |              | count          | 36       | 14      | 50    |
|                       |              | Percentage (%) | 72       | 28      | 100   |

#### DISCUSSION :

OPC are utilized worldwide in agriculture as well as in household gardens (92). This easy availability of the compounds has caused a steady increase in accidental and suicidal poisoning, mostly in developing countries. Treatment of OPC poisoning should be started straightaway and must not wait for the results of serum cholinesterase level for treatment of OPC poisoning, apart from ways to decontaminate, is principally aimed at reversing the consequences of the compound by the administration of atropine. Atropine is highly effective in antagonizing the effects of organophosphates at muscarinic receptor sites and is administered to adults at a dose of 2 mg every 5 to 10 minutes. PAM which reactivates and regenerates acetylcholinesterase from the OPC-cholinesterase complex is used as an antidote to treat OPC poisoning. Hypokalemia manifests with loss of deep tendon reflexes, paralysis, lassitude, muscular weakness, and death (which is usually due to respiratory distress and cardiac arrhythmias). Cause of death in both hypokalemia and acute OPC poisoning is frequently muscular weakness and respiratory distress. It is not unusual for patients with a severe weakness to have markedly low serum potassium. Hypokalemia induced morbidity and mortality are linked to complications secondary to respiratory failure or cardiac arrhythmia. In this study, the impact of hypokalemia in OPC poisoning has been studied in 50 patients.

#### CONCLUSION:

It was concluded from this study that hypokalemia contributes significantly to both morbidity and mortality in organophosphorus compound poisoning significantly. Routine measurement of serum potassium should be done, as it can be a cost-effective and reliable marker and will be helpful in prognostication and prediction of the outcome in OPC poisoning.

#### REFERENCES:

1. KM Mogda, Afaf Al El-Kashoury, MA Rashed, KM, Nature and Science, 2009, 7, 2, 1-15
2. Pillay VV. Comprehensive Medical Toxicology. 1st ed. Hyderabad, India: Paras Publications; 2003.
3. Murat S, Muhammed G. Intensive care management of organophosphate insecticide poisoning. Crit Care 2001; 5: 211-5.
4. Aziza MH, Sultan ST. Organophosphorus insecticide poisoning: Management in surgical intensive care unit. J Coll Physicians Surg Pak 2005; 15: 100-2.