



A Prospective Observational Study of Acid Base Disorders in Organophosphorous Poisoning in a Tertiary Care Centre

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Introduction

Pesticides include a wide variety of compounds which include insecticides, herbicides, fungicides, and others. There are more than 1000 active substances determined in approximately 35,000 preparations of pesticides used in agriculture. Organo phosphorus (OP) pesticide poisoning is a serious hazard. Farmers are at high risk for accidental exposure to OPC poisoning as it can be absorbed from ingestion (mc route), inhalation or tropical contact. However, poisoning with suicidal intent is more common than accidental exposure. Intentional ingestion of OP pesticides has been common for the past 40 years. A fatal outcome is often related to delay in diagnosis or improper management. OPCs are available as dust, granules, or liquids. OPCs are very well absorbed from the lungs, gastrointestinal tract, skin, mucous membranes, and conjunctiva following inhalation, ingestion, or topical contact. Most OPCs are lipophilic. Peak levels of most OP insecticides measure around 6 h after oral ingestion in man. Exposure to OP vapors rapidly causes upper airway irritation and bronchospasm followed by systemic symptoms. Acute respiratory failure is the most common cause of death in OPC

poisoning due to increased secretions and inadequate ventilation. One of the cause for complications is an acid base imbalance. Subsequent measures must be carried out by recognizing and correcting the acid-base disturbance at the earliest possible time. Evaluation of acid-base status in the OPC poisoning patients plays a critical role as its early recognition can alter the management and prognosis.

Aim of the Study

This study aims to access the arterial blood gas (ABG) analysis as a prognostic tool in OP poisoning patients

Materials and Methods

This is a prospective observational study where a specific set of data was collected from the patients who fulfilled the inclusion criteria. A total of 50 patients presented to our emergency department were taken into study.

Inclusion Criteria

- Age of more than 18
- Clinical features suggestive of OP poisoning.

- Consumption of OPC as per patient, relatives, referring doctor and pesticide container

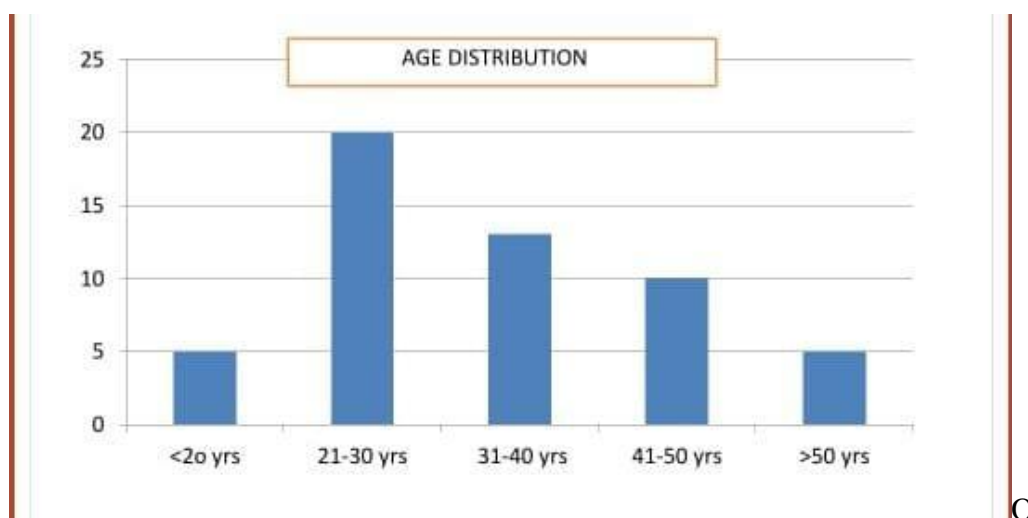
pulmonary disease, congestive heart diseases.

Exclusion Criteria

- Any mixed ingestions
- Age<18 years
- Time of consumption more than 24 hours
- Comorbidities like chronic kidney disease, chronic liver diseases chronic obstructive,

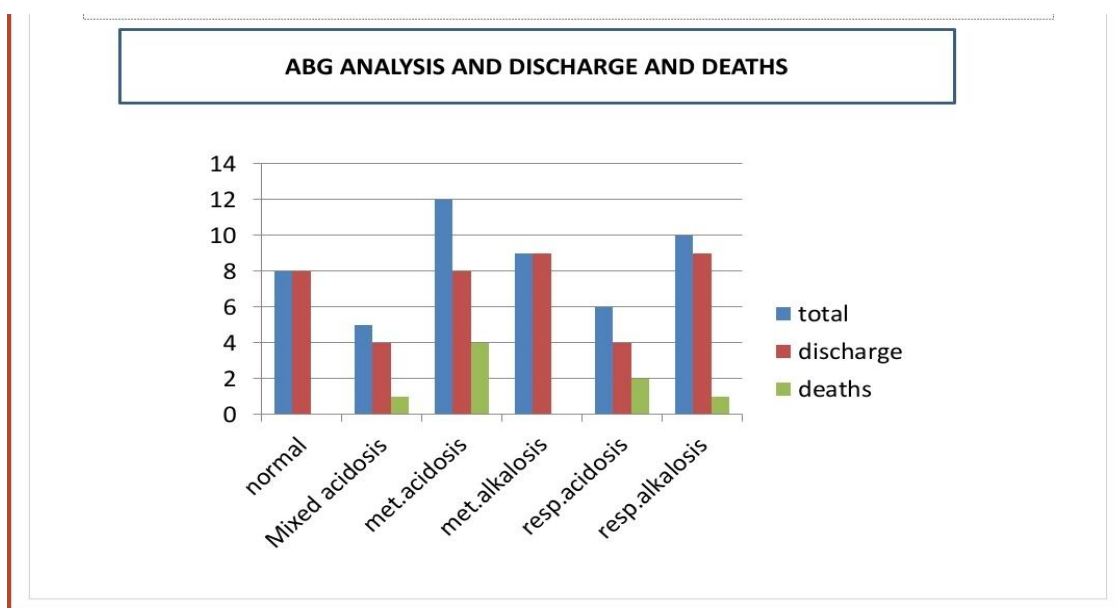
Results

- Most numbers of patients who consumed OPCs were found to be between 20 and 40 years which were 33 in number.
- The next significant group was 40–50 years old which had 7 patients
- Males were the more predominant group in OP ingestions in this study



- Out of 12 cases with initial metabolic acidosis, 3 deaths were reported.
- Out of 6 cases with respiratory acidosis, 2 deaths were reported.

- Out of 50 cases, 18 cases require invasive ventilation.
- Out of 50 cases, 42 patients recovered and 8 deaths were noted.



Discussion

- The diagnosis of OP pesticide poisoning is based on the patient's history, clinical presentation, and laboratory tests.
- In a patient with a positive history, a typical odor on the breath, characteristic symptoms and decreased RBC and plasma cholinesterase levels, diagnosis is not difficult to make.
- In OP poisoning, OPC inhibits acetyl cholinesterase activity, increases the accumulation of acetylcholine in the synaptic gap, and decreases degradation of acetylcholine, thus leading to excessively increased cholinergic symptoms, which disturbs neurotransmission of the central and peripheral nervous system.
- This excess synaptic acetylcholine stimulates muscarinic receptors and then depresses or paralyzes the nicotinic receptors.
- Abnormal neuromuscular transmission mediated through nicotinic receptors may cause carbon dioxide retention and alter the acid-base balance.
- A retrospective analysis of OP poisoning patients, found a direct correlation between the severity of poisoning and mortality and the presence of pre-treatment acidosis either metabolic or respiratory.
- Among the patients who presented with acidosis, extreme acidosis (7.1) was associated with increased ICU stay when compared with mild-to-moderate acidosis. Patients who presented with alkalosis had decreased ICU stay irrespective of their ranges.
- Thus, the present study showed that among the acid-base disorders in the initial ABG in OP poisoning patients, acidosis was associated with increased morbidity.
- In patients presenting with acidosis, metabolic acidosis is predominantly associated with increased morbidity and

mortality followed by respiratory acidosis subsequently.

- Mixed acidosis ranks the third in increasing the morbidity and mortality of the patients presenting with OP poisoning.
- Metabolic alkalosis and respiratory alkalosis were associated with decreased morbidity and less deaths were reported in these cases.
- Most of the patients presented to the ED within 1–4 h of ingestion. Most of them had received gastric lavage in the pre-hospital care setup.
- In all the cases, ABG, serum cholinesterase levels, electrolytes, and other routine biochemical investigations were carried out.
- Serum cholinesterase was mostly lowered in all cases.
- Arterial blood was drawn for acid-base analysis. Around 76% of cases had acid-base disturbances, whereas only 24% had normal ABG reports.
- According to Moulali et al., the study which involved 20 cases 85% had acid-base disturbance and 15% had normal ABG reports

Conclusion

- The present study highlights the importance of ABG as an effective tool in the quick assessment of prognosis in OP poisoning patients.
- From this study, it is evident that the initial ABG performed on patients presenting with OP poisoning could help in determining the prognosis of the patients even before hospitalization.
- Special consideration should be given to patients presenting with acidosis (metabolic, respiratory, and mixed) as it is concluded from this study that acidosis (predominantly metabolic acidosis) is associated with increased morbidity and mortality.

- As a result, the treatment can be intensified and implemented quickly without any delay

References

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