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A RETROSPECTIVE ANALYSIS OF ORGANOPHOSPHORUS POISONING IN PATIENTS PRESENTING TO A TERTIARY CARE RURAL HOSPITAL

Pharma

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ABSTRACT

Introduction: Organophosphorus (OP) poisoning continues to be a major public health challenge in rural India due to its widespread use as agricultural pesticides and limited awareness of safety measures. Rural hospitals frequently serve as the first point of care, where timely pharmacological management plays a critical role in patient outcomes. **Aims and Objectives:** To evaluate and assess clinical characteristics, pharmacological interventions, hospital stay duration and treatment outcomes of OP poisoning patients in a tertiary care rural hospital. **Methods:** A retrospective observational study was conducted for 3 months in patients with confirmed OP poisoning admitted in the casualty department of Pravara Rural Hospital. Data regarding demographics, clinical features, treatment given, hospital stay, and outcomes were collected and analysed. **Results:** Total 18 cases with confirmed OP poisoning were evaluated. Mean age of patients was 30.3 years (range 15–69), with 61% males. Common symptoms and signs included altered sensorium, vomiting, sweating, miosis/mydriasis, and respiratory distress. Gastric lavage, Atropine and Pralidoxime were administered in 66.7% cases. No treatment was received in 33.3% cases due to late arrival or rapid deterioration. Mean duration of hospital stay was found 4.05 days. 10 patients survived, while 8 patients succumbed, reflecting a mortality rate of 44.4%. **Conclusion:** Pharmacotherapy with Atropine and Pralidoxime, when initiated early, is a life-saving measure in OP poisoning cases. Strengthening rural healthcare systems with training, antidote availability at primary health care centres and community awareness is vital to reduce preventable deaths.

KEYWORDS

Organophosphorus poisoning, Atropine, Pralidoxime, Gastric lavage.

INTRODUCTION

Organophosphorus (OP) compounds are widely used pesticides in agricultural communities. Due to their easy availability, OP poisoning is one of the **most common causes of poisoning in rural India**, contributing significantly to both accidental and intentional self-poisoning cases [1,2].

Globally, OP poisoning is responsible for an estimated **200,000 deaths annually**, the majority occurring in developing countries [1]. In India, the burden is particularly high due to extensive farming practices, unsafe storage of pesticides, lack of personal protective equipment, and limited awareness about toxicity [2,3].

Clinically, OP poisoning is characterized by **excessive cholinergic stimulation** resulting in **muscarinic symptoms** like salivation, lacrimation, urination, diarrhoea, vomiting, miosis, bronchorrhea, **nicotinic symptoms** like fasciculations, weakness, tachycardia /hypertension and **CNS effects** like seizures, altered sensorium, coma [4].

Effective management requires **early diagnosis and prompt pharmacotherapy**, primarily with **Atropine (to counter muscarinic effects)** and **Pralidoxime (to reactivate acetylcholinesterase)** [1,5].

However, in rural hospitals, delayed presentation, inadequate supply of antidotes, and lack of trained staff often worsen outcomes [6,7].

Thus, studying the **clinical profile and treatment outcomes** of OP poisoning in rural healthcare settings is crucial for improving patient survival and guiding healthcare policy.

METHODS

Study Design and Setting

This was a **retrospective observational study** conducted over a period of **three months** at the **Casualty and Emergency Medicine Department of Pravara Rural Hospital**, a tertiary care teaching hospital catering predominantly to a rural population in Maharashtra, India. The hospital serves as a major referral centre for surrounding villages and primary healthcare facilities.

Study Population

All patients presenting with a **clinical diagnosis of acute organophosphorus poisoning** during the study period were included. Diagnosis was based on a combination of **history of exposure**, clinical features consistent with cholinergic toxicity, and treating physician documentation in medical records.

Inclusion Criteria

- Patients of **either gender** and **all age groups**
- Confirmed or clinically suspected cases of **organophosphorus compound poisoning**
- Patients admitted through the **emergency department** during the study period

Exclusion Criteria

- Poisoning due to **non-organophosphorus compounds**
- Cases with **incomplete medical records**
- Patients brought dead to the hospital

Data Collection

Data were collected retrospectively from **case records, emergency registers, treatment charts, and discharge summaries** using a **pre-designed structured data collection proforma**. The following variables were recorded:

- **Demographic details:** age, gender
- **Clinical characteristics:** presenting symptoms and signs such as vomiting, sweating, altered sensorium, pupillary changes, respiratory distress, and seizures
- **Treatment details:** use of gastric lavage, atropine, pralidoxime, supportive therapy (oxygen, intravenous fluids, mechanical ventilation if required)
- **Outcome measures:** duration of hospital stay, survival, and mortality

RESULTS

Total 18 cases with confirmed OP poisoning were evaluated over a

period of 3 months. Mean age of the patients was found to be **30.3 years** (range 15–69), with **61% males** and **39% females**.

Common symptoms and signs like altered sensorium, vomiting, sweating, miosis/mydriasis, and respiratory distress was observed in almost 80% cases. Gastric lavage, Atropine and Pralidoxime were administered in **66.7%** cases. No treatment was received in **33.3%** cases due to late arrival or rapid deterioration. Mean duration of hospital stay was found **4.05 days**. **10 patients survived**, while **8 patients succumbed**, reflecting a mortality rate of **44.4%**.

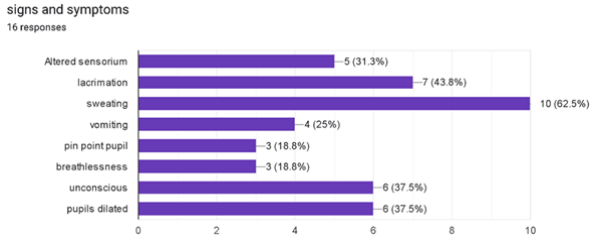
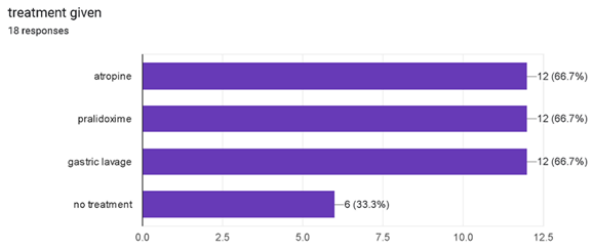


FIGURE 1



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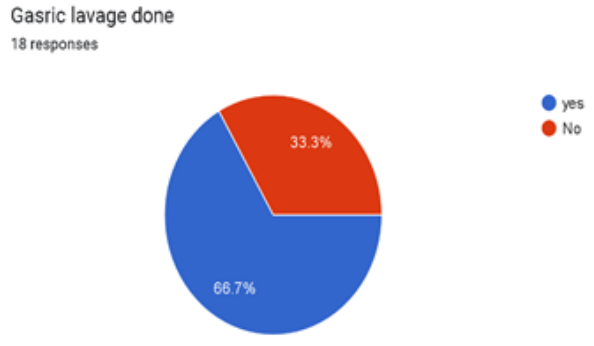

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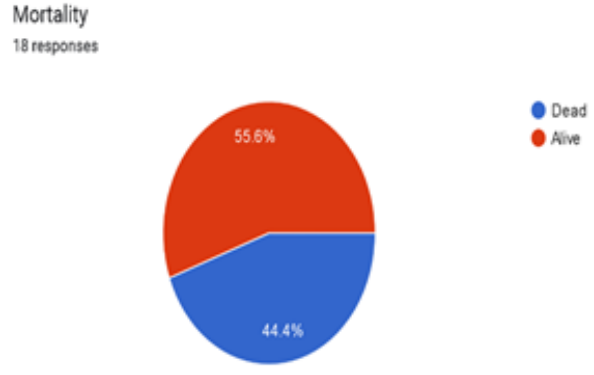

FIGURE 4

DISCUSSION

The findings from this retrospective study highlight the ongoing burden of OP poisoning cases in rural India.

The **mean age of 30.3 years** and **male predominance (61%)** observed in this study are consistent with earlier reports indicating that OP poisoning predominantly affects young adults in the economically productive age group[1]. Similar demographic patterns have been reported in multiple Indian and international studies, where males constituted 60–75% of cases, largely due to occupational exposure and psychosocial stressors associated with agricultural communities.[8, 12.] Overall, the findings of the present study are in agreement with existing literature regarding demographic and clinical patterns of OP poisoning; however, the higher mortality highlights the **critical gaps in rural emergency healthcare delivery**

The **clinical manifestations** observed in the present study—altered sensorium, vomiting, sweating, pupillary abnormalities, and respiratory distress—are characteristic of acute cholinergic toxicity and are comparable to findings reported in previous studies[9]. Excessive stimulation of muscarinic, nicotinic, and central nervous system receptors due to acetylcholinesterase inhibition forms the basis of these symptoms, as described in standard pharmacology texts and clinical reviews.[10,11]

With regard to **pharmacological management**, Atropine and Pralidoxime were administered in **66.7% of cases** in the present study. Earlier studies have demonstrated that prompt atropinisation combined with oxime therapy significantly improves patient outcomes by reversing muscarinic effects and reactivating acetylcholinesterase.[1, 10] Early initiation of Atropine and Pralidoxime was associated with improved survival, consistent with existing literature.[7]

Atropine is a **competitive, reversible antagonist of muscarinic acetylcholine receptors (M1–M5).** Atropine **competitively blocks muscarinic receptors.** Prevents ACh from binding to these receptors **Pralidoxime** is an **oxime that reactivates inhibited acetylcholinesterase**.

Pralidoxime binds to the **phosphorylated AChE.** Removes the OP molecule from the enzyme**, Reactivates acetylcholinesterase,** Restores breakdown of acetylcholine

In contrast, a considerable proportion of patients in this study did not receive antidote therapy due to delayed presentation or rapid clinical deterioration, a problem commonly encountered in rural healthcare settings.[11,12]

The **mortality rate of 44.4%** observed in this study is higher than that reported in most tertiary care hospital-based studies from India, where mortality generally ranges between 10% and 30%.[1, 12]. This increased mortality can be attributed to delayed referral, inadequate pre-hospital care and limited availability of antidotes at grass root level. Similar observations have been reported by **Sungur and Güven et al**, who emphasized that delayed treatment and lack of supportive critical care significantly worsen outcomes in OP poisoning.[6]

Strengthening primary and secondary healthcare systems, ensuring the availability of antidotes at Primary health care centres, training healthcare personnel in early atropinisation, and improving community awareness regarding early hospital presentation are essential measures to reduce preventable deaths due to OP poisoning.[1 ,8,11]

CONCLUSION

Early pharmacotherapy with Atropine and Pralidoxime is life-saving. Strengthening rural healthcare with training, timely pharmacotherapy, antidote availability at primary health care centres, and community awareness is vital to reduce preventable deaths.

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CONFLICT OF INTEREST

None declared.

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