



Clinical profile and outcome of organophosphorus poisoning in a tertiary care centre, a prospective observational study

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Date of Submission: 20-07-2023

Date of Acceptance: 31-07-2023

ABSTRACT: Organophosphorus Compounds are main cause of accidental and suicidal poisoning in agrarian countries like India. The importance of studying Organophosphorus poisoning pesticides in India can be understood from the fact that agriculture is a major component of the Indian economy. In developing countries like India, where there is a wide variation in the socioeconomic status and cultural and religious practices, the epidemiological factors such as geography, occupation, socioeconomic status, literacy rate, and cultural and religious practices can influence the clinical presentation and outcome of the poisoning patients. The objective of the study was to study clinical manifestations, outcomes and complications of organophosphate poisoning presenting to a tertiary care teaching hospital in India.

I. INTRODUCTION

Self-poisoning with insecticides and pesticides comprise about 14–20% of global suicidal cases, and the estimated mortality is 110,000–168,000 deaths each year compared with estimated 371,000 deaths in the late 1990s^(1,2). An estimated 3 million or more people worldwide are exposed to OP each year, accounting for about 300,000 deaths⁽³⁾. According to systematic reviews supplemented by mortality data from World Health Organization, about 385 million cases of unintentional acute pesticide poisoning occur annually world-wide including around 11,000 fatalities⁽⁴⁾. Based on a worldwide farming population of approximately 860 million this means that about 44% of farmers are poisoned by pesticides every year⁽⁴⁾. In India, deaths due to Organophosphorus poisoning are more common in southern and central India⁽⁵⁾. They are widely used for self-harm due to their ready availability and easy accessibility⁽⁶⁾. In Indian studies, the incidence of suicidal poisoning using OP ranges from 10.3% to 43.8%⁽⁷⁾. In India, Organophosphorus compounds are easily accessible; therefore, it is the most

common mode of poisoning fatalities as a source of both intentional and unintentional poisoning^(8,9). These chemicals are the main components of herbicides, pesticides, and insecticides. Organophosphorus are also the main components of nerve gas and most important of all as a tool. OP pesticide exposure may occur through inhalation, ingestion, or dermal contact and The severity of the symptoms depends on the amount ingested, route of absorption, and rate of metabolic breakdown of the insecticide⁽¹⁰⁾. These compounds enter the human body by ingestion, inhalation or skin absorption, and irreversibly inhibit Anti Choline Esterase and permanently blocks the action of an enzyme⁽¹¹⁾. Accumulation of Acetylcholine activates muscarinic and nicotinic receptors at synapses within the peripheral and central nervous systems producing neurotoxic sequelae with a high mortality rate^(12,13). Patients exhibit muscarinic and nicotinic symptoms depending upon severity of compounds⁽¹⁴⁾. Muscarinic symptoms such as nausea, vomiting, diarrhoea, sweating, salivation, urination, stool incontinence, lacrimation, miosis, and bradycardia and nicotinic signs such as muscular weakness, fasciculation, paralysis, convulsion, and coma are found. Poisoning patients with the evidence of organ failure require admission to the intensive care unit (ICU) for organ support and specific management. There are various clinical entities that can determine the clinical course and outcome in the ICU. Owing to the limited availability of resources, all OP poisoning patients are not managed in ICUs in the Indian setup.

II. MATERIALS AND METHODS

The present study protocol was approved by the Institutional Ethics Committee (IEC).

STUDY DESIGN : This was a single centre, prospective observational study.



STUDY PERIOD: The study was performed over a period of 18 months i.e., from December 2020 to October 2022.

STUDY SETTING: The study was performed in the medicine Department of a tertiary care hospital located in Central India. **STUDY POPULATION:** All patients diagnosed with OP poisoning visiting the casualty of medicine department over a period of 18 Months were included in the study.

SELECTION OF PATIENTS: INCLUSION CRITERIA: 1. Patients aged more than 18 years 2. Patients diagnosed with OP poisoning.

EXCLUSION CRITERIA: 1. Patients diagnosed with Non-Organophosphorus compound poisoning 2. Patients diagnosed with mixed compound poisoning.

CRITERIA FOR WITHDRAWAL: 1. Intercurrent illness that prevents further administration of therapy. 2. Patient withdraws consent from the study. 3. If deemed in the best medical interest of the patient. 4. Protocol violation: Related to protocol specific study procedures.

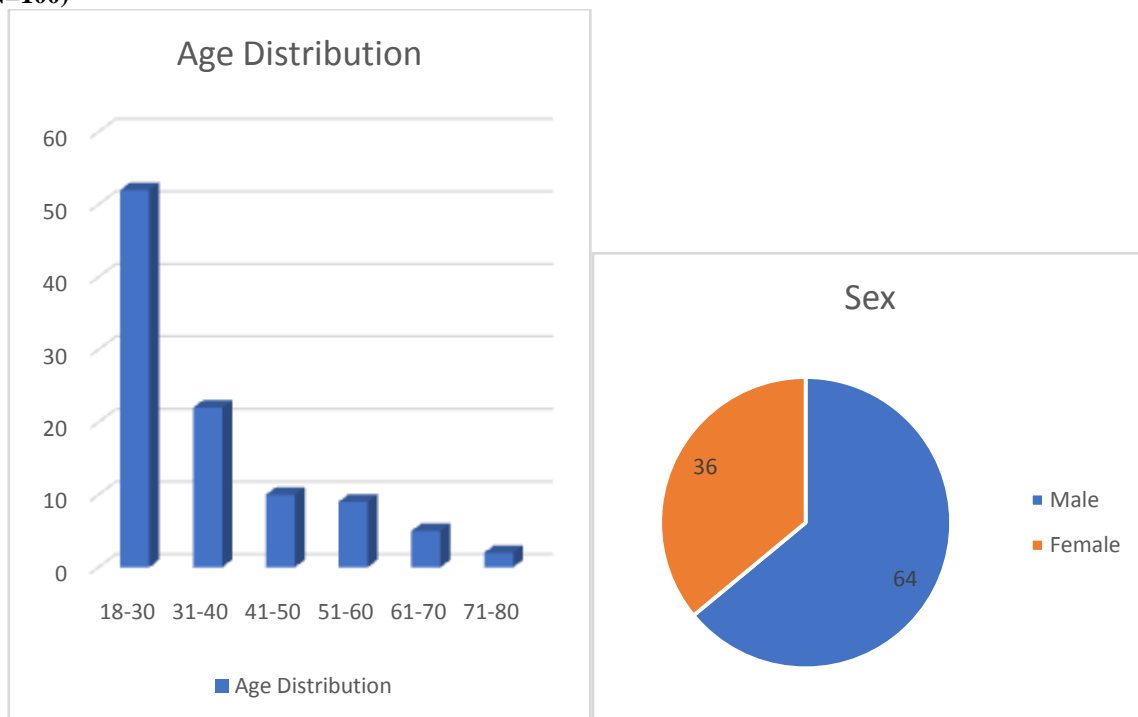
DATA COLLECTION: HISTORY: Detailed demographic data with respect to name, age, detailed address, education, occupation, monthly income, marital status was noted.

DATA MANAGEMENT: Data was entered from case record form in excel sheet. Care was taken to enter data accurately. Backup for data was maintained. Confidentiality was maintained. Data validation was done periodically by guide and subject experts. Written informed consent was obtained from each patient before enrolment in the study by explaining the nature of the study to the patients as in patient information sheet.

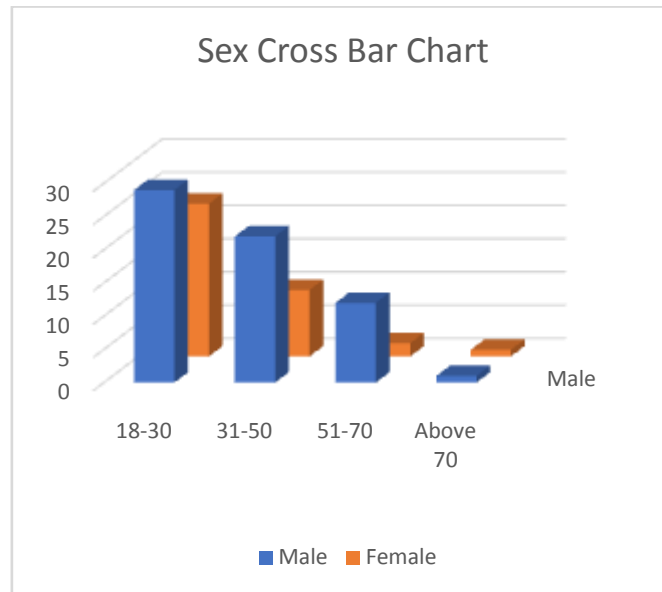
STATISTICAL ANALYSIS: Data was expressed as percentage and mean \pm S.D and analysed using unpaired or paired t test as applicable • Ordinal data was depicted using Median • MS Excel was used for collecting the data. • Chi square test or Fischer exact test was used to analyze the significance of difference between frequency distribution of the data. • P value <0.05 was considered as statistically significant.

III. OBSERVATION AND RESULTS

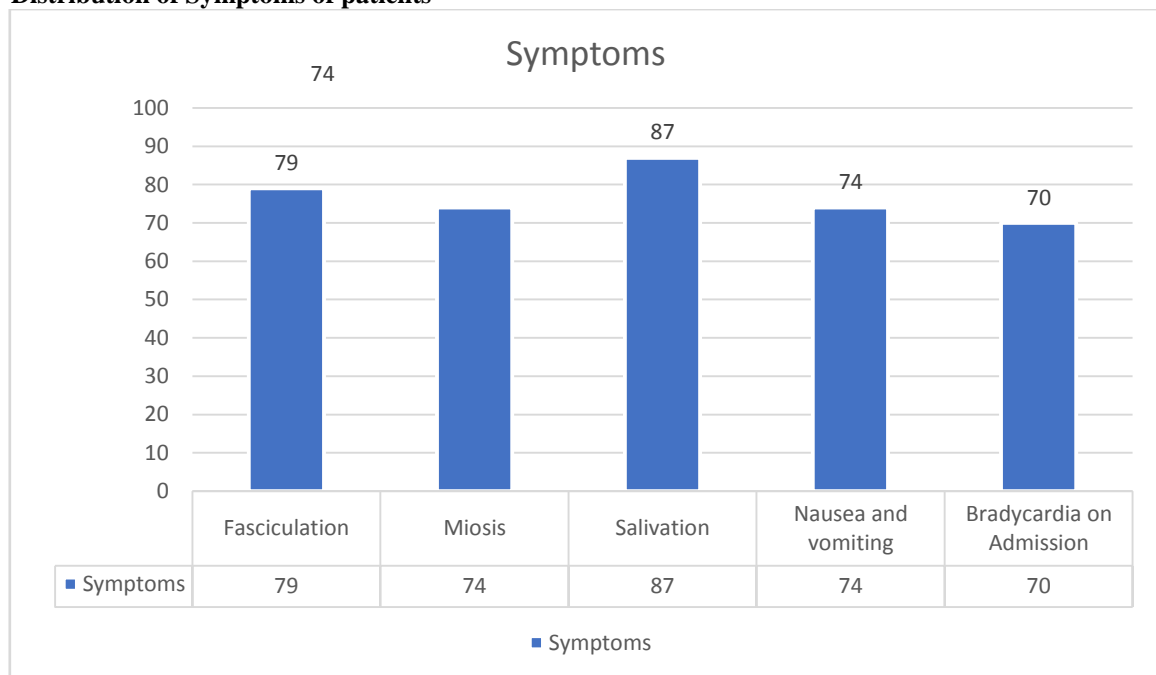
Distribution of patients according to age group (N=100) Distribution of Patients according to SEX (N=100)



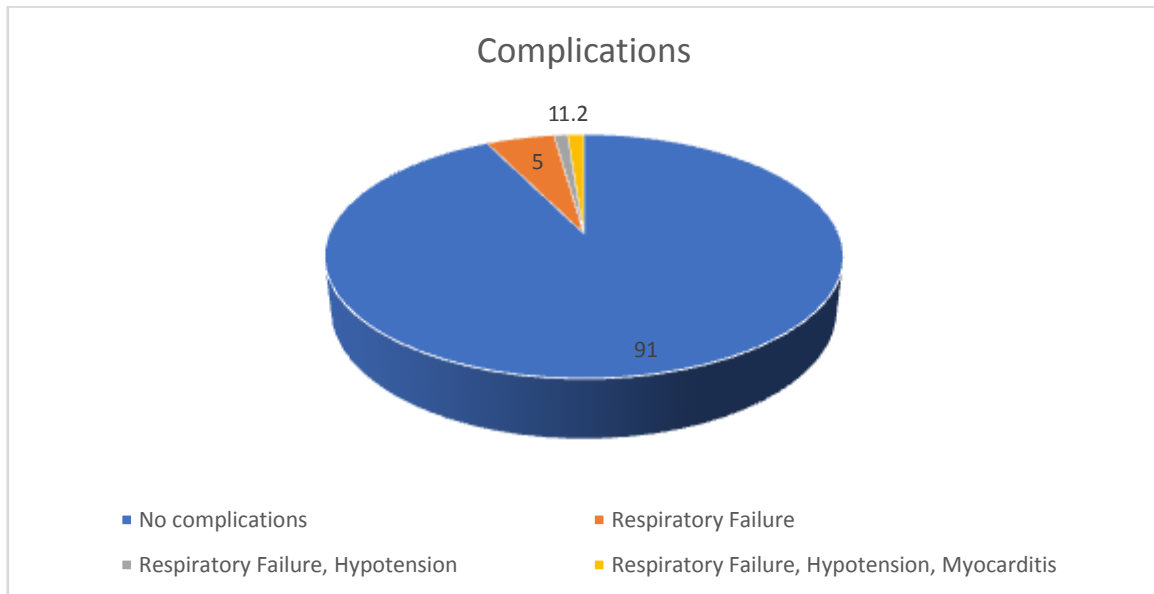
Association between Age and Sex.



Distribution of Symptoms of patients



Distribution of Complications of Patients



Association between serum cholinesterase and Final outcome.

Serum Cholinesterase value	Outcome		P value
	Alive	Death	
Below 1000	25	3	0.020
1000 - 5000	68	0	
5001- 10000	40	0	

IV. DISCUSSION

Organophosphorus pesticides are used for agriculture, vector control, and domestic purposes. Its self-poisoning is a clinical problem found mostly in rural regions of developing countries and kills around 200,000 people every year⁽²⁾. Acute poisoning is a medical emergency with significant morbidity and mortality. Most of the poisoning is due to the intention of self-harm⁽¹⁵⁾. The mean age of the patients included in our study population was majority of patients belonged to the age group 18-30 which is 52% followed by 22% of the age group 31-40 and the minimum number of patients belonged to the age group >= 70 which is 2%. Majority of gender in our study population observed was male that is 64% and the rest was female that is 36%. In our study of Miosis was present in 74% patients. Salivation was present in the 87% patients. Nausea and vomiting was presents in 74% of the patients and bradycardia in 70% of the patients and fasciculation are present in 79% patients. Complications show majority of patients are having respiratory failure that is 5% followed by respiratory, hypotension & myocarditis 2% of the study, and 91% of patients has no complications. In our study a significant difference between Age and the final outcome. The majority

of patients expired between the age group 51-70. In a retrospective study done by Patil G.A, 3/46 of the patients were aged ≥50 years, out of which 1 died⁽¹⁶⁾. In our study a significant difference between Serum cholinesterase and the final outcome was seen. In our study Miosis was present in 74% of patients. Salivation was present in 87% of patients. Nausea and vomiting were present in 74% of the patients and bradycardia in 70% of the patients and fasciculation are present in 79% of patients. the maximum number of patients had miosis similar to our study⁽¹⁷⁾. In a study by Bandy TH et.al out of 133 patients the most consistent feature was miosis (93.2%) similar to the above study also increased salivation was seen in 86.4%.

V. CONCLUSION

- In a study conducted in 100 patients of acute Organophosphorus compound poisoning it is concluded that due to easy access in developing countries like India, Organophosphorus compounds are the main tool for suicidal poisoning particularly in farmers.
- In this study a clinical profile of a case of acute organophosphorus poisoning the most common patients were young with male preponderance. Majority of the patients were farmers. There was



high mortality between the age group of 50-70 years and mostly seen in males. Atropine was as effective as Pralidoxime, also our study showed significant association between outcome and serum Cholinesterase level.

- Patient presented with Muscarinic and Nicotinic manifestations. Most common muscarinic manifestation was found to be miosis and nicotinic manifestation was Fasciculation.
- The most common complication seen was Respiratory Failure followed by myocarditis and ventilation associated pneumonia.
- Organophosphorus compound poisoning is a serious condition that needs rapid diagnosis and urgent treatment. Respiratory Failure is a major reason for mortality so prompt intervention can decrease the mortality in patients.

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