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CLINICAL PRESENTATION AND OUTCOME OF PATIENTS PRESENTING WITH ACUTE ORGANOPHOSPHORUS POISONING IN EMERGENCY DEPARTMENT OF LADY READING HOSPITAL PESHAWAR

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ABSTRACT

Objective: To determine the clinical presentation and outcome of patients presenting with acute organophosphorus poisoning in the Emergency Department of Lady Reading Hospital Peshawar.

Methods: This cross sectional study was conducted in the Department of General Medicine and Emergency Department of Lady Reading Hospital Peshawar from 15 July 2025 to 15 November 2025. A total of 139 patients with acute organophosphorus poisoning were enrolled through consecutive nonprobability sampling. Demographic characteristics clinical manifestations and outcomes were recorded using a structured proforma. Clinical presentations including bronchospasm urination miosis salivation and lacrimation were assessed. Data were analyzed using Statistical Package for Social Sciences version 27 and a p value of less than 0.05 was considered statistically significant.

Results: The mean age of the patients was 31.8 ± 11.6 years and 84 patients were male. Deliberate self poisoning was observed in 72.7 percent of cases. Miosis was the most common clinical manifestation and was present in 97.8 percent of patients followed by salivation in 84.9 percent lacrimation in 70.5 percent bronchospasm in 69.1 percent and urinary manifestations in 58.3 percent. Recovery was achieved in 125 patients whereas 14 patients expired giving a mortality rate of 10.1 percent. Bronchospasm showed a significant association with mortality.

Conclusion: Acute organophosphorus poisoning was associated with a high frequency of cholinergic manifestations and considerable mortality. Early recognition and prompt management may improve clinical outcomes and reduce fatal complications.

KEYWORDS: Organophosphorus poisoning. Clinical presentation. Cholinergic manifestations. Emergency department. Mortality. Pesticide poisoning.

INTRODUCTION

Organophosphorus compounds are widely used chemical substances that have been employed in agriculture for the control of insects and pests. These compounds have contributed significantly to agricultural productivity and food preservation in many developing countries. Despite their beneficial applications these agents have also become an important source of poisoning and toxicity because of their widespread availability and easy accessibility.[1] Organophosphorus poisoning is considered one of the leading causes of acute toxicological emergencies particularly in low income and middle income countries where pesticides can be purchased without strict regulations. The extensive use of these compounds has resulted in a substantial increase in accidental and intentional poisoning cases and has created a considerable burden on healthcare systems.

Acute organophosphorus poisoning occurs following ingestion inhalation or dermal exposure to these compounds. The toxic effects are produced by irreversible inhibition of acetylcholinesterase enzyme which leads to accumulation of acetylcholine at neuromuscular junctions and cholinergic synapses.[2] Excessive acetylcholine stimulates muscarinic nicotinic and central nervous system receptors and results in the development of a cholinergic crisis. The manifestations may vary from mild symptoms to severe respiratory failure cardiovascular collapse and death depending on the quantity of poison consumed and the delay in initiation of treatment.

Organophosphorus poisoning remains a major public health issue throughout the world. According to global estimates millions of cases of pesticide poisoning occur every year and several hundred thousand deaths are attributed to these compounds.[3] A large proportion of these deaths have been reported from South Asia where agricultural communities

are frequently exposed to pesticides and where deliberate self poisoning is a common method of suicide. The burden of organophosphorus poisoning is therefore considered a serious social and medical challenge that requires immediate attention from healthcare providers and policymakers.

Pakistan is an agricultural country where pesticides are extensively utilized for crop protection and farming activities. The easy availability of these compounds and limited awareness regarding their hazards have contributed to a high frequency of poisoning cases.[4] Most patients presenting with acute organophosphorus poisoning belong to young and economically productive age groups and therefore the socioeconomic impact of this condition is substantial. Mortality remains high in many healthcare facilities because of delayed presentation inadequate transportation and lack of specialized treatment facilities.

The clinical manifestations of organophosphorus poisoning are diverse and involve multiple organ systems. Patients frequently present with muscarinic symptoms such as excessive salivation lacrimation miosis bronchospasm vomiting diarrhea and increased urinary frequency.[5] Nicotinic manifestations including muscle weakness fasciculations and paralysis may also occur. Central nervous system involvement may result in confusion seizures coma and respiratory depression. The severity of clinical presentation depends on the type of organophosphorus compound amount of exposure and duration before initiation of therapy.

Respiratory complications are considered the principal cause of mortality in acute organophosphorus poisoning. Bronchospasm increased bronchial secretions respiratory muscle weakness and central respiratory depression may lead to severe hypoxia and respiratory failure.[6] Timely recognition of these manifestations and prompt administration of antidotal therapy are essential for improving patient outcomes. Early diagnosis based on clinical features and biochemical confirmation through measurement of acetylcholinesterase activity remains the cornerstone of management.

Several studies have reported that miosis salivation and lacrimation are among the most common manifestations of organophosphorus poisoning.[7] Other investigators have observed that altered consciousness hypotension and respiratory distress are associated with poor prognosis and increased mortality. Despite advances in critical care and toxicology the mortality associated with severe organophosphorus poisoning remains considerable especially in resource constrained settings where intensive care facilities may not be readily available.

The outcome of patients with organophosphorus poisoning depends upon several factors including quantity of poison ingested type of compound time interval before treatment and availability of supportive care facilities.[8] Patients who receive prompt treatment with atropine oximes and ventilatory support usually have favorable outcomes whereas delayed presentation is associated with significant morbidity and mortality. Identification of factors associated with poor outcomes may facilitate early intervention and improve survival rates.

The emergency department represents the first point of contact for most patients with acute organophosphorus poisoning. Appropriate assessment of clinical presentation and early initiation of treatment are essential components of management. Detailed evaluation of presenting features can assist clinicians in identifying patients at increased risk of complications and mortality.[9] Furthermore understanding the pattern of clinical manifestations and outcomes may contribute to the development of evidence based protocols and optimized treatment strategies.

Although organophosphorus poisoning has been investigated extensively in different regions of the world limited information is available regarding the clinical presentation and outcomes of these patients in the local population of Peshawar. Most previous studies have focused primarily on mortality rates or therapeutic interventions and have provided inadequate information regarding the frequency of specific clinical manifestations. There is also a scarcity of local data describing the relationship between presenting symptoms and patient outcomes in tertiary care settings. Variations in environmental factors socioeconomic conditions and healthcare infrastructure may influence the clinical profile and prognosis of these patients and therefore findings from other populations may not be directly applicable to the local setting.

Another important research gap is the absence of recent data from major tertiary care hospitals in Khyber Pakhtunkhwa regarding the spectrum of organophosphorus poisoning and the outcomes achieved with current treatment practices. Comprehensive evaluation of clinical manifestations and outcomes is necessary to identify areas requiring improvement and to establish appropriate management guidelines. Such information may also assist in planning preventive strategies and public health interventions aimed at reducing the burden of pesticide poisoning.

The objective of this study was to determine the clinical presentation and outcome of patients presenting with acute organophosphorus poisoning in the emergency department of Lady Reading Hospital Peshawar.

MATERIALS AND METHODS

Study Design

This study was designed as a cross sectional study to determine the clinical presentation and outcome of patients presenting with acute organophosphorus poisoning in the emergency department. The study was conducted over a period of four months from 15 July 2025 to 15 November 2025. The study aimed to evaluate the frequency of various

clinical manifestations and to determine the outcomes of patients presenting with acute organophosphorus poisoning. A nonprobability consecutive sampling technique was employed to enroll all eligible patients during the study period.

Study Setting
The study was carried out in the Department of General Medicine and Emergency Department of Lady Reading Hospital Peshawar. Lady Reading Hospital is one of the largest tertiary care teaching hospitals in Khyber Pakhtunkhwa and receives referrals from urban and rural regions of the province. The hospital is equipped with emergency and intensive care facilities for the management of poisoning and toxicological emergencies. The institution provides twenty four hour emergency services and has specialized medical and critical care units for the treatment of patients with acute poisoning.

Study Duration
The duration of the study extended from 15 July 2025 to 15 November 2025 after obtaining approval from the Institutional Review Board and the relevant research authorities. Data collection and patient recruitment were continued throughout the study period until the required sample size was achieved.

Sample Size
The sample size was calculated using the World Health Organization sample size calculator. The calculation was based on the previously reported mortality rate of ten percent among patients with acute organophosphorus poisoning with a confidence level of ninety five percent and a margin of error of five percent[10]. The estimated sample size was one hundred and thirty nine patients. A total of 139 patients fulfilling the eligibility criteria were included in the study.

Sampling Technique
Consecutive nonprobability sampling was used for patient selection. All patients presenting with acute organophosphorus poisoning who fulfilled the inclusion criteria during the study period were approached for participation in the study. This sampling technique ensured inclusion of all available cases and minimized the possibility of selection bias.

Study Population
The study population consisted of male and female patients presenting to the emergency department with clinical and biochemical evidence of acute organophosphorus poisoning. Patients belonged to different occupational and socioeconomic backgrounds and represented both urban and rural populations. The diagnosis of acute organophosphorus poisoning was established on the basis of history of exposure clinical features and laboratory assessment of acetylcholinesterase activity.

Inclusion Criteria
Patients of either gender between eighteen and seventy years of age were included in the study. Individuals presenting with acute organophosphorus poisoning and exhibiting clinical manifestations including bronchospasm urination miosis salivation and lacrimation were considered eligible. Patients with reduced acetylcholinesterase activity and a confirmed diagnosis of organophosphorus poisoning were enrolled after obtaining informed consent.

Exclusion Criteria
Patients with poisoning due to substances other than organophosphorus compounds were excluded from the study. Individuals with mushroom poisoning myasthenia gravis opioid poisoning and nicotine poisoning were not included because these conditions may produce clinical features that mimic organophosphorus poisoning. Patients with incomplete clinical information and those who declined participation in the study were also excluded.

Data Collection Procedure
The study was initiated after obtaining approval from the Ethical Review Committee of Lady Reading Hospital Peshawar. Written informed consent was obtained from all patients or their attendants before enrollment. A structured proforma was used for data collection. Baseline demographic information including age gender body mass index profession and reason for poison exposure was recorded.
All enrolled patients underwent detailed clinical examination at the time of presentation. Clinical manifestations including bronchospasm urination miosis salivation and lacrimation were assessed according to predefined operational criteria. The diagnosis of bronchospasm was established by the presence of wheezing coughing dyspnea and chest tightness. Miosis was identified by pupillary constriction with pupil size less than two millimeters. Salivation was determined by excessive drooling and wetness around the mouth. Lacrimation was defined as excessive tear production while urinary manifestations were assessed by increased frequency of urination or urinary retention.

Blood samples were obtained for measurement of acetylcholinesterase activity and other routine laboratory investigations. All assessments and observations were conducted under the supervision of consultant physicians having more than five years of post fellowship clinical experience. Patients received standard treatment according to hospital protocols including atropine therapy supportive care and ventilatory support whenever required.

Outcome Assessment

The outcome of patients was determined during hospital stay and was categorized as recovery or death. Recovery was defined as complete resolution of presenting symptoms with normalization of acetylcholinesterase activity ranging between 3000 and 12000 units per liter. Mortality was defined as death occurring during hospitalization due to complications related to acute organophosphorus poisoning.

Ethical Consideration

The study was conducted in accordance with the principles of the Declaration of Helsinki and institutional ethical guidelines. Approval was obtained from the Institutional Review Board of Lady Reading Hospital Peshawar before commencement of the study. Confidentiality and privacy of patient information were maintained throughout the study. All collected information was anonymized and used solely for research purposes. Participation in the study was entirely voluntary and patients retained the right to withdraw from the study at any stage without any effect on their treatment.

Statistical Analysis

The collected data were entered and analyzed using the Statistical Package for Social Sciences version 27. Quantitative variables including age and body mass index were assessed for normality using the Shapiro Wilk test and were presented as mean and standard deviation or median with interquartile range where appropriate. Qualitative variables including gender profession reason for poison exposure clinical manifestations and outcomes were expressed as frequencies and percentages.

Potential effect modifiers including age body mass index profession and reason for poison exposure were controlled through stratification. Post stratification chi square test or Fisher exact test was applied to determine associations between categorical variables. A p value of less than 0.05 was considered statistically significant. The findings were presented in tables and descriptive summaries to facilitate interpretation and comparison with previously published studies.

RESULTS

Patient Demographics and Baseline Characteristics

A total of 139 patients presenting with acute organophosphorus poisoning were included in the study. The mean age of the patients was 31.8 ± 11.6 years with an age range of 18 to 69 years. Male patients constituted the majority of the study population with 84 patients while females accounted for 55 cases. The mean body mass index was 24.7 ± 3.8 kg/m². Most patients belonged to the younger age group and were from economically productive age categories. Farmers and housewives represented the most common occupational groups among the enrolled patients. Deliberate self poisoning was identified as the principal reason for exposure to organophosphorus compounds.

Table 1: Demographic and Baseline Characteristics of the Study Population

Variable	Value
Total patients	139
Mean age (years)	31.8 ± 11.6
Mean body mass index (kg/m²)	24.7 ± 3.8
Male	84 (60.4%)
Female	55 (39.6%)
Farmers	39 (28.1%)
Housewives	34 (24.5%)
Laborers	28 (20.1%)
Students	21 (15.1%)
Others	17 (12.2%)
Deliberate self poisoning	101 (72.7%)
Accidental exposure	38 (27.3%)

The baseline analysis demonstrated that acute organophosphorus poisoning predominantly affected young adults and occurred more frequently among males. Intentional ingestion represented the leading cause of poisoning and highlighted the importance of psychosocial factors in the epidemiology of this condition.

Clinical Presentation of Patients with Acute Organophosphorus Poisoning

The frequency of various clinical manifestations was analyzed in all patients. Miosis was the most common presenting feature and was observed in almost all patients. Salivation and lacrimation were also highly prevalent. Bronchospasm and urinary disturbances were present in a substantial proportion of cases. The distribution of clinical manifestations is shown in Table 2.

Table 2: Clinical Presentation of Patients with Acute Organophosphorus Poisoning

Clinical Presentation	Number of Patients	Percentage
Miosis	136	97.8%
Salivation	118	84.9%
Lacrimation	98	70.5%
Bronchospasm	96	69.1%
Urinary manifestations	81	58.3%

The results revealed that cholinergic manifestations were highly prevalent among patients presenting with organophosphorus poisoning. Miosis represented the most frequent finding and served as an important clinical clue in establishing the diagnosis.

Outcome of Patients with Acute Organophosphorus Poisoning

The outcome of patients was categorized into recovery and mortality. The majority of patients recovered after receiving appropriate treatment while a smaller proportion expired due to complications related to poisoning. The outcome distribution is presented in Table 3.

Table 3: Clinical Outcome of Patients with Acute Organophosphorus Poisoning

Outcome	Number of Patients	Percentage
Recovered	125	89.9%
Expired	14	10.1%
Total	139	100%

The overall mortality rate was 10.1 percent which indicates that despite advances in management acute organophosphorus poisoning remains associated with significant risk of death.

Association of Outcome with Gender

The relationship between patient outcome and gender was evaluated. Mortality was slightly higher among male patients compared with females although the difference did not reach statistical significance. The findings are summarized in Table 4.

Table 4: Association between Gender and Outcome

Gender	Recovered n (%)	Expired n (%)	p value
Male (n = 84)	73 (86.9%)	11 (13.1%)	0.28
Female (n = 55)	52 (94.5%)	3 (5.5%)	

The findings demonstrated that both genders experienced favorable outcomes with appropriate management and no statistically significant association was observed between gender and mortality.

Association of Bronchospasm with Clinical Outcome

Bronchospasm was further analyzed to determine its relationship with patient outcome. Mortality was significantly higher among patients presenting with bronchospasm compared with those without respiratory manifestations. The results are shown in Table 5.

Table 5: Association Between Bronchospasm and Outcome

Bronchospasm	Recovered n (%)	Expired n (%)	p value
Present (n = 96)	82 (85.4%)	14 (14.6%)	0.01
Absent (n = 43)	43 (100%)	0 (0%)	

The statistical analysis demonstrated a significant association between bronchospasm and mortality. Patients with respiratory manifestations were more likely to experience adverse outcomes and required intensive monitoring and management.

Association of Reason for Poison Exposure with Outcome

The relationship between the reason for poison exposure and patient outcome was also evaluated. Mortality was higher among patients with deliberate self poisoning than among those with accidental exposure although the difference was not statistically significant. The findings are presented in Table 6.

Table 6: Association Between Reason for Poison Exposure and Outcome

Reason for Exposure	Recovered n (%)	Expired n (%)	p value
Deliberate self poisoning (n = 101)	89 (88.1%)	12 (11.9%)	0.41
Accidental exposure (n = 38)	36 (94.7%)	2 (5.3%)	

The findings indicate that deliberate self poisoning constituted the major cause of organophosphorus exposure and was associated with a higher frequency of adverse outcomes.

Overall Analysis of Clinical Presentation and Outcome

The present study demonstrated that acute organophosphorus poisoning predominantly affected young adults and was more common among males. Miosis salivation lacrimation and bronchospasm represented the most frequent clinical manifestations. Most patients achieved complete recovery following appropriate treatment while mortality remained significant in a minority of cases. Respiratory involvement particularly bronchospasm showed a statistically significant association with poor outcome and represented an important prognostic factor. The findings emphasize the importance of early recognition of cholinergic manifestations and prompt institution of treatment in reducing morbidity and mortality associated with acute organophosphorus poisoning.

DISCUSSION

The present study evaluated the clinical presentation and outcome of patients presenting with acute organophosphorus poisoning in the emergency department of a tertiary care hospital. The findings demonstrated that acute organophosphorus poisoning remained an important medical emergency that predominantly affected young adults and resulted in considerable morbidity and mortality. The majority of patients in the present study were male and belonged to the economically productive age group.[11] Similar observations have been documented in previous investigations where young men constituted the largest proportion of affected individuals because of greater occupational exposure and increased psychosocial stress.

The mean age observed in the present study was comparable to findings reported from other developing countries where the highest incidence of organophosphorus poisoning was recorded among individuals between twenty and forty years of age.[12] Younger individuals are frequently exposed to pesticides because of their involvement in agricultural activities and because they represent the population group most vulnerable to intentional self poisoning. The social and economic implications of poisoning in this age group are substantial because loss of productivity and prolonged hospitalization may place a significant burden on families and healthcare systems.

Male predominance was observed in the current study. Comparable findings have been described by several investigators who reported a higher frequency of poisoning among men because of increased outdoor activities and direct contact with agricultural chemicals.[13] However certain studies have shown a higher proportion of female patients because intentional self poisoning among women is common in some regions. These differences may be related to variations in cultural practices and accessibility to toxic substances.

The present study demonstrated that deliberate self poisoning represented the principal reason for exposure to organophosphorus compounds. Similar patterns have been identified in previous studies where intentional ingestion accounted for the majority of poisoning cases.[14] The easy availability of pesticides and inadequate mental health services have been considered major factors contributing to the high frequency of self poisoning in developing countries. Public awareness campaigns and restriction of access to highly toxic pesticides may therefore play an important role in reducing the burden of organophosphorus poisoning.

The clinical manifestations observed in the present study reflected the typical cholinergic syndrome associated with acetylcholinesterase inhibition. Miosis was the most common clinical finding and was identified in nearly all patients. Similar frequencies of miosis have been reported in previous investigations where pupillary constriction was considered an important diagnostic feature of organophosphorus poisoning.[15] The presence of miosis often facilitates rapid clinical diagnosis and permits early initiation of treatment even before biochemical confirmation becomes available.

Excessive salivation and lacrimation were also highly prevalent in the current study. Comparable findings have been described by other researchers who reported that increased secretions represented characteristic manifestations of muscarinic receptor stimulation.[16] These clinical features frequently contribute to airway compromise and may predispose patients to aspiration and respiratory complications. Early administration of atropine therefore remains essential for controlling secretions and improving patient outcomes.

Bronchospasm was observed in a large proportion of patients and showed a significant association with mortality. Similar findings have been reported in previous studies where respiratory manifestations represented important predictors of adverse outcomes.[17] Respiratory failure remains the principal cause of death in organophosphorus poisoning because of increased bronchial secretions bronchospasm respiratory muscle weakness and depression of the respiratory center. Patients presenting with respiratory distress therefore require immediate evaluation and aggressive supportive management including oxygen therapy and mechanical ventilation whenever indicated.

Urinary manifestations were identified in more than half of the patients enrolled in the present study. Comparable frequencies have been documented by other investigators who reported increased urinary frequency and incontinence as common manifestations of cholinergic excess.[18] Although urinary symptoms are generally not life threatening their presence contributes to the overall clinical diagnosis and reflects the severity of parasympathetic stimulation.

The mortality rate observed in the current study was approximately ten percent. Similar mortality rates have been reported in several studies conducted in developing countries.[19] However lower mortality rates have also been documented from institutions with advanced intensive care facilities and rapid access to antidotal therapy. Variations in mortality may be influenced by differences in the type of pesticide ingested quantity of poison consumed time to presentation and availability of critical care resources.

The high recovery rate observed in the present study demonstrated the effectiveness of early diagnosis and prompt treatment. Administration of atropine supportive care and timely respiratory management may significantly improve patient survival.[20] Previous studies have also emphasized that early intervention and aggressive resuscitation are associated with favorable outcomes and reduced mortality. Delayed presentation to healthcare facilities remains an important determinant of poor prognosis and continues to be a major challenge in many low resource settings.

The statistically significant relationship between bronchospasm and mortality identified in the present study deserves particular attention. Similar associations have been observed in earlier investigations where respiratory complications were strongly associated with increased risk of death.[21] Bronchospasm may indicate severe poisoning and extensive cholinergic involvement and therefore should alert clinicians regarding the need for intensive monitoring and aggressive management. Identification of such prognostic indicators may facilitate risk stratification and appropriate allocation of healthcare resources.

The findings of the present study have important implications for emergency medicine and public health. Acute organophosphorus poisoning continues to represent a substantial burden on emergency departments particularly in agricultural regions. The high prevalence of intentional poisoning indicates the necessity for comprehensive preventive strategies including mental health support community education and regulation of pesticide distribution.[22] Strengthening poison control services and improving access to emergency medical care may further reduce mortality and long term complications associated with organophosphorus poisoning.

The present study also contributes valuable local data regarding the clinical profile and outcomes of organophosphorus poisoning in Peshawar. Most available literature originates from other geographical regions and may not accurately reflect local patterns of disease. Differences in agricultural practices socioeconomic conditions and healthcare infrastructure may influence both presentation and prognosis. Therefore locally generated evidence is essential for developing context specific management guidelines and preventive interventions.

Another important contribution of the present study is the identification of the most frequent clinical manifestations and factors associated with poor outcome. Recognition of these factors may enable healthcare providers to identify high risk patients at an early stage and to institute appropriate therapeutic measures without delay.[23] Such an approach may ultimately improve survival and reduce the burden of poisoning related complications.

The findings of the present investigation support the need for continuous training of healthcare professionals in the recognition and management of organophosphorus poisoning. Educational initiatives directed toward emergency physicians and primary healthcare providers may improve the quality of care delivered to these patients and facilitate early referral of severe cases to specialized centers.

Future research should focus on the evaluation of additional prognostic indicators and long term neurological outcomes among survivors of acute organophosphorus poisoning. Multicenter studies involving larger populations may provide a more comprehensive understanding of the epidemiology and determinants of outcome in this important toxicological emergency.

CONCLUSION

Acute organophosphorus poisoning was shown to be a common medical emergency among young adults and was characterized by prominent cholinergic manifestations. Favorable recovery was achieved in most patients following prompt treatment and supportive care. Increased mortality was observed in patients presenting with respiratory involvement and severe clinical manifestations.

Limitations

The study was conducted at a single tertiary care center and wider population representation was not achieved. The sample size was limited and long term follow up of survivors was not performed. Detailed assessment of neurological sequelae and psychiatric factors was not undertaken.

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