

Acute Pancreatitis Presenting As A Rare Complication In Organophosphorous Compound Poisoning In A Tertiary Care Hospital

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Abstract:

Background: Organophosphate (OP) poisoning is one of the serious occupational hazards worldwide and easily accessible pesticides for suicidal poisoning. OP poisoning is one of the most common causes of poisoning in rural India. Acute pancreatitis in OP poisoning is seen in 5.7%–29% of the cases it is one of the rare complications. This case study is aimed to recognize the early signs and symptoms of acute pancreatitis to avoid missing this complication and aid the primary as well as the emergency physicians to timely diagnose acute pancreatitis in these patients, thus preventing significant mortality(I)

Materials and Methods: A prospective observation study was carried out over a period of 1 year (January 2022–March 2023) of acute poisoning with OP insecticides admitted in AH &RC, BG Nagara, Mandya. In the majority of cases, the clinical picture of acute pancreatitis followed the oral ingestion of several Organophosphorus compounds more commonly Malathion and Chlorpyrifos. Detailed clinical history of patients was collected and after informed consent and blood samples were taken for biochemical evaluation including total leukocyte count, differential count, serum electrolytes, kidney function tests, liver function tests, serum calcium and lipid profile. An ultrasound abdomen and CT abdomen was done in selected cases. Serum amylase and lipase levels were determined on admission and then every day in the morning.(II)

Results: The study included a total of 40 cases with organophosphorus compound poisoning. Amongst a total of 40 patients 28(70%) were females and 14 (30%) were males. All patients above the age of 16 years were included. Through the 1-year period, serial biochemical evaluation was done in all cases of suspected OP induced pancreatitis. Patients with three to four fold elevated levels of lipase (above 60 U/L) seen in 50%(20 out of 40) and amylase levels above 300 U/L seen in 62%(25 out of 40), were diagnosed with acute pancreatitis. Leukocytosis (15,000–20,000 leukocytes/ μ L) was observed in 70% (28 patients). Patients with more severe disease showed hemoconcentration with hematocrit values >44% and/or prerenal azotemia with a blood urea nitrogen (BUN) level >22 mg/dL. Hyperbilirubinemia (serum bilirubin >4.0 mg/dL) occurred in 7%(3 patients). However, jaundice is transient, and serum bilirubin levels return to normal in 4–7 days. Patients were further classified based on incidence of severity of pancreatitis into OP induced mild(70%), moderate(17%) and severe pancreatitis(12%). Majority of patients diagnosed to have acute pancreatitis not responding to supportive care also underwent an ultrasonographic study and computerized tomography. Two types of pancreatitis are recognized on imaging as interstitial or necrotizing.(III)

Conclusion: As acute pancreatitis in organophosphate intoxication may be more common than reported, appropriate biochemical evaluation, serial serum pancreatic enzymes and appropriate imaging studies should be more liberally utilized. Early recognition and appropriate therapy for acute pancreatitis may lead to an improved prognosis. (44)

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I. Introduction

Poisoning is one of the serious public health problems worldwide. It ranks 45th in total death in the world. The highest incidence has been reported from exposure of household agents (44.1%) followed by drugs

(18.8%) and agricultural pesticides (12.8%). Organophosphate (OP) poisoning is one of the most common causes of poisoning in developing countries like India. ⁽¹⁾

Organophosphate (OP) poisoning is one of the serious occupational hazards worldwide and easily accessible pesticides for suicidal poisoning. It is characterized by three main syndromes – cholinergic syndrome, intermediate syndrome and syndrome of delayed polyneuropathy ⁽¹⁾

Pancreatitis due to OP is caused by increased pressure within the pancreatic duct as a result of increased exocrine secretion of pancreatic fluid. Generally, acute pancreatitis due to OP is mild. In fact, previous reports showed that the effect of organophosphates on the pancreas lasts only for 72hrs, and any complications associated with acute pancreatitis often improves with treatment in 3–5 days⁽³⁾

This case series is aimed to recognize the early signs and symptoms of acute pancreatitis to avoid missing this complication especially in critically ill patients with op poisoning, as OP sometimes can cause severe necrotic pancreatitis or pancreatic pseudocysts, but can be avoided with early detection with biochemical markers and appropriate intensive care including antibiotics, fluid resuscitation or HDF⁽³⁾(hemodiafiltration). This will aid the primary as well as the emergency physicians to timely diagnose acute pancreatitis in these patients, thus preventing significant mortality. ([3]

II. Material And Methods

A prospective observational study was carried out over a period of 1 year (January 2022-March 2023) of acute poisoning with OP insecticides admitted in AH &RC, BG Nagara, Mandya. The study included a total of 40 cases with organophosphorus compound poisoning. Amongst a total of 40 patients 28(70%) were females and 14 (30%) were males.

Study Design: Prospective observational study

Study Location- This is a tertiary care teaching hospital based study done in Department of General Medicine, at Adichunchunagiri Institute of Medical Sciences, Bellur

Study Duration: January 2022 – March 2023

Sample size- 40 patients

Study Source and collection method: Data collection will be done from Records of cases of organophosphorus compound poisoning patients admitted to medical ICU, department of medicine at AIMS BELLUR who meet the inclusion and exclusion criteria will be included.

Statistical analysis: All the data collected will be entered into an excel sheet and the data will be statistically analyzed. Descriptive statistics- frequency, percentage, mean, standard deviation and correlation coefficient to determine the relationship between data will be used.

Procedure methodology:

Patients admitted with OP compound poisoning were selected based on relevant inclusion and exclusion criteria and was distributed based on age and gender. Detailed clinical history of patients was collected and after informed consent and blood samples were taken for biochemical evaluation including total leukocyte count, differential count, serum electrolytes, kidney function tests, liver function tests, serum calcium, lipid profile. Serum amylase and lipase levels were determined on admission and then every day in the morning.

The complications was detected using markers of severity such as SIRS score, BISAP index, APACHE II score, Hematocrit, BUN, Organ failure Assessment (Modified Marshall score) at admission and within 24 hrs. Patients were further classified based on symptoms and biochemical evaluations into OP induced mild, moderate and severe pancreatitis.

Patients who were not responding to supportive care 3-5 days into hospitalization were assessed for local complications using imaging studies such as Abdominal ultrasound and CT with iv contrast. Two types of pancreatitis are recognized on imaging as interstitial or necrotizing based on pancreatic perfusion.

Inclusion criteria:

1. Patients aged more than 16 years
2. All organophosphorus compound poisoning patients admitted during study period.

Exclusion criteria:

- 1) The cases of overt salivary gland disease and gut perforation or infarction were excluded.

2) Patients previously diagnosed with chronic pancreatitis

Lab Investigations:

- CBC, Differential count, Serum amylase, Serum lipase, Liver function tests, Renal function tests, Serum calcium, BUN, Lipid Profile , Ultrasound abdomen and Pelvis, CT Abdomen

III. Result

Distribution of subjects based on Gender

Male : 12(30%)

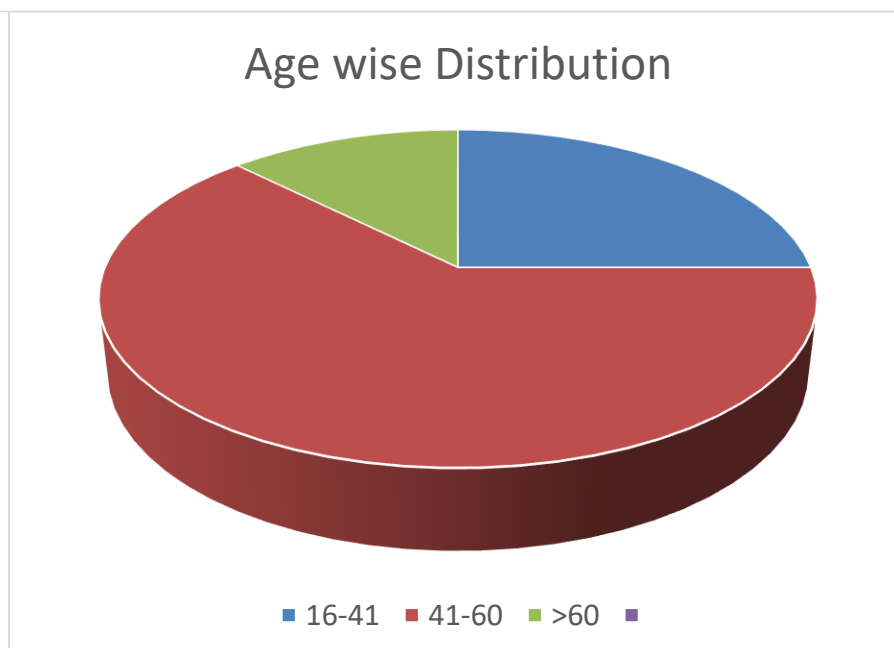
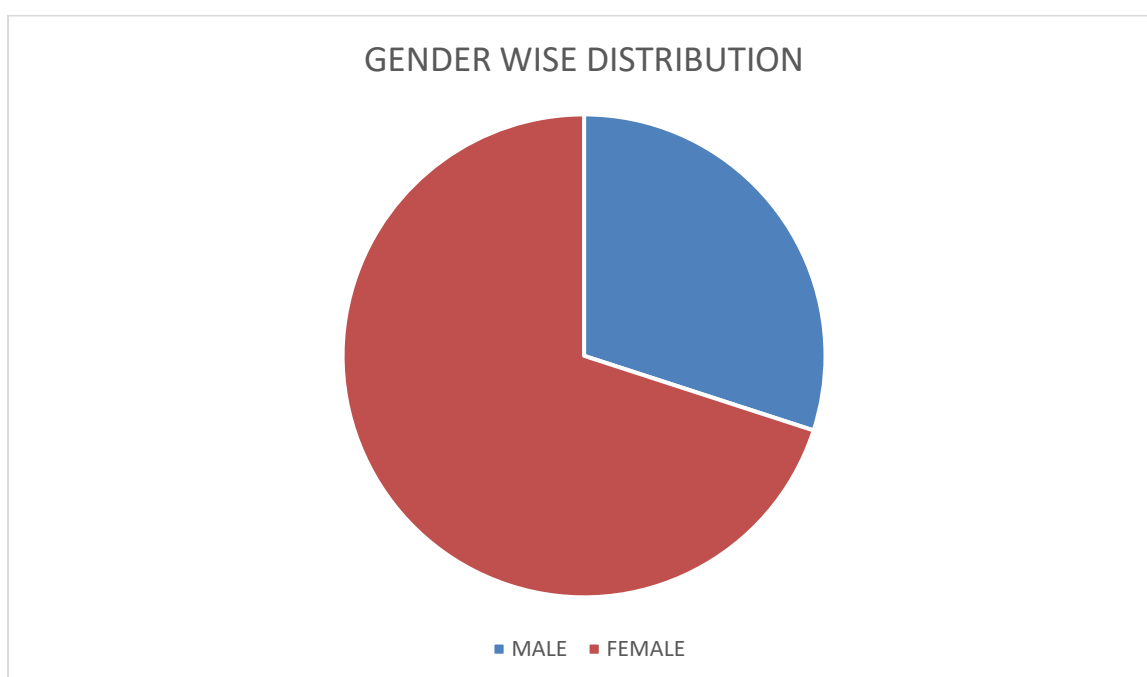
Female : 28 (70%)

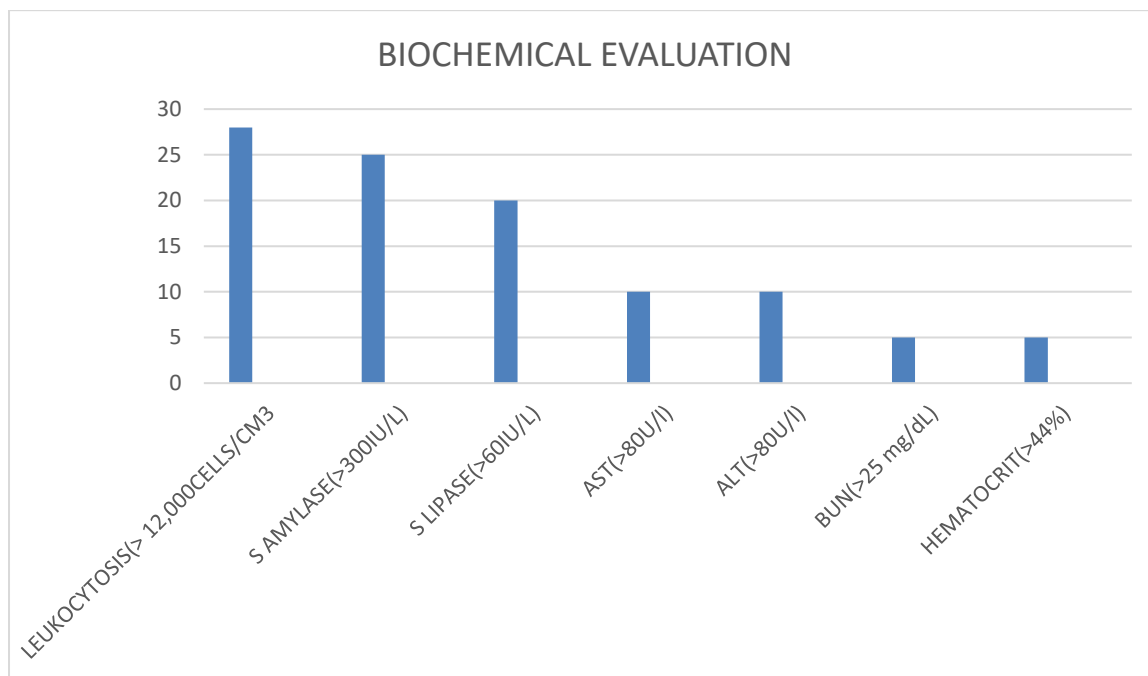
Distribution of subjects based on age

16 – 40 years – 10(25%)

41 – 60 years – 25(62.55)

Above 60 years – 5(12.5%)



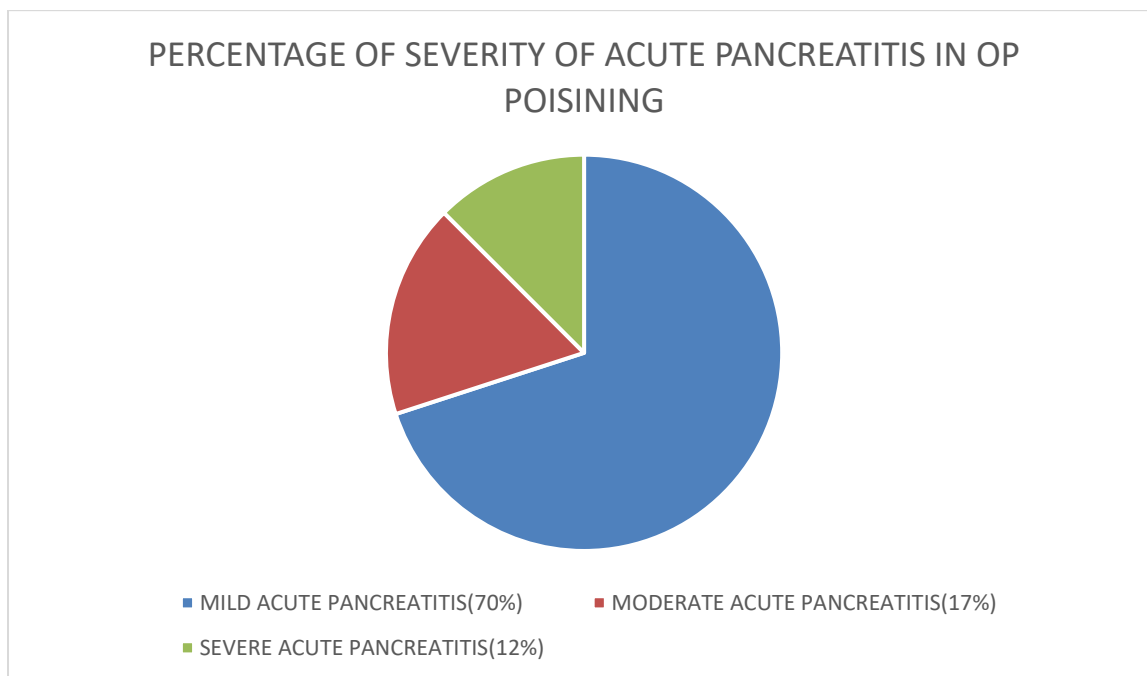


The complications was detected using markers of severity such as SIRS score, BISAP index, APACHE II score, Hematocrit, BUN, Organ failure Assessment (Modified Marshall score) at admission and within 24 hrs. (5)

Table 1:Table detecting markers of severity of acute pancreatitis(5)


Risk Factors for Severity	Markers of Severity at Admission or within 24 h	Markers of Severity during Hospitalization
<ul style="list-style-type: none"> Age >60 years Obesity, BMI >30 kg/m² Comorbid disease (based on Charlson comorbidity index) 	<ul style="list-style-type: none"> SIRS—defined by presence of 2 or more criteria: <ul style="list-style-type: none"> Core temperature 38°C Heart rate >90 beats/min Respirations >20/min or Pco₂ <32mmhg White blood cell count >12,000/μL APACHE II (\geq8 at 24 h) Hemoconcentration (hematocrit >44%) Admission BUN (>22 mg/dL) BISAP score (\geq3 present) <ul style="list-style-type: none"> (B) BUN >25 mg/dL (I) Impaired mental status (S) SIRS: \geq2 of 4 present (A) Age >60 years (P) Pleural effusion Organ failure (Modified Marshall score) (\geq1 present): <ul style="list-style-type: none"> Cardiovascular: systolic BP <90mmHg, HR>130bpm Pulmonary: Pao₂ >60mmHg Renal: serum creatinine >2.0 mg/dL 	<ul style="list-style-type: none"> Persistent organ failure (\geq48 h) Pancreatic or extra pancreatic necrosis
Abbreviations: APACHE II, Acute Physiology and Chronic Health Evaluation II; BISAP, Bedside Index of Severity in Acute Pancreatitis; BMI, body mass index; BP, blood pressure; BUN, blood urea nitrogen; SIRS, systemic inflammatory response syndrome.		

Patients were further classified based on symptoms and biochemical evaluations into OP induced mild, moderate and severe pancreatitis. (6)



Patients who were not responding to supportive care 3-5 days into hospitalization were assessed for local complications using imaging studies such as Abdominal ultrasound and CT with iv contrast. Two types of pancreatitis are recognized on imaging as interstitial or necrotizing based on pancreatic perfusion. ⁽⁵⁾

Table 3: Common CT findings in Acute Pancreatitis (5)

TYPE	DEFINITION	COMPUTED TOMOGRAPHY FEATURES
Interstitial pancreatitis	Interstitial pancreatitis occurs in 90–95% of admissions for acute pancreatitis and is characterized by acute inflammation of the pancreatic parenchyma and peripancreatic tissues, but without recognizable tissue necrosis	Pancreatic parenchyma enhancement by IV contrast agent and without peripancreatic necrosis showing mild peripancreatic stranding 
Necrotizing Pancreatitis	Necrotizing pancreatitis occurs in 5–10% of acute pancreatitis admissions and may not evolve until several days of hospitalization. Inflammation associated with pancreatic parenchymal and/or peripancreatic necrosis	Lack of pancreatic parenchymal enhancement by IV contrast agent and/or presence of findings of peripancreatic necrosis, evidenced by the lack of contrast enhancement in the pancreatic body with very minimal enhancement noted at the distal most aspect of the pancreatic tail.



IV. Discussion

1. OP poisoning is one of the most common poisonings seen in Emergency Medicine departments in developing countries, requiring intensive monitoring and urgent intervention.
2. It presents as diverse symptoms and signs in the form of muscarinic, nicotinic and central nervous system symptoms. One of the screening tools to diagnose OP poisoning is measurement of acetylcholinesterase and butyrylcholinesterase/plasma cholinesterase levels.
3. Management of these patients included the use of atropine to alleviate the muscarinic and central nervous system manifestations of organophosphate poisoning, pralidoxime to improve the force of muscular contraction
4. Acute pancreatitis has been reported in the past in approximately 12% patients with OP poisoning. OP induced pancreatitis is an unusual presentation of poisoning. This manifestation is usually camouflaged by systemic toxicity of the poisoning. The suggested underlying mechanism is excessive cholinergic stimulation of the pancreas by OP compounds. The contraction of sphincter of Oddi leads to increased internal pressure inside the pancreatic duct. The excessive acetylcholine occludes the ampulla of Vater and pancreatic duct leading to stimulation of pancreatic acinar cells, causing acute interstitial pancreatitis.([3])
5. Abdominal pain may vary from mild discomfort to severe, constant, and incapacitating distress. Characteristically, the pain, which is steady and boring in character, is located in the epigastrium region and may radiate to the back, chest, flanks, and lower abdomen.
6. To detect and diagnose acute pancreatitis early a series of biochemical evaluation must be undertaken. Serum amylase and lipase values threefold or more above normal are strongly supportive of the diagnosis. However, it should be noted that there is no correlation between the severity of pancreatitis and the degree of serum lipase and amylase elevations or serial trends. After 3–7 days, even with continuing evidence of pancreatitis, total serum amylase values tend to return toward normal. However, pancreatic lipase levels may remain elevated for 7–14 days.
7. Serum lipase activity increases in parallel with amylase activity and is more specific than amylase, making it the preferred test. A serum lipase measurement can be instrumental in differentiating a pancreatic or nonpancreatic cause for hyperamylasemia. It should be recognized that amylase elevations in serum and urine occur in many conditions other than pancreatitis (also seen in patients with interstitial ischemia, enteritis and hypersalivation).([6])
8. Leukocytosis (15,000–20,000 leukocytes/ μ L) occurs frequently. Patients with more severe disease may show hemoconcentration with hematocrit values $>44\%$ and/or prerenal azotemia with a blood urea nitrogen (BUN) level >22 mg/dL resulting from loss of plasma into the retroperitoneal space and peritoneal cavity. Hyperbilirubinemia (serum bilirubin >4.0 mg/dL) occurs in 7% of patients. However, jaundice is transient, and serum bilirubin levels return to normal in 4–7 days. Serum alkaline phosphatase and transaminase levels may also be transiently elevated. Selected laboratory studies (liver profile, serum triglycerides, serum calcium), and an abdominal ultrasound are recommended in the emergency ward
9. Two phases of acute pancreatitis have been defined, early (<2 weeks) and late (>2 weeks), which primarily describe the hospital course of the disease. In the early phase of acute pancreatitis, which lasts 1–2 weeks, severity is defined by clinical parameters rather than morphologic findings. Most patients exhibit SIRS, and if this persists, patients are predisposed to organ failure
10. The late phase is characterized by a protracted course of illness and may require imaging to evaluate for local complications. The critical clinical parameter of severity, as in the early phase, is persistent organ failure. These patients may require supportive measures such as renal dialysis, ventilator support, or need for supplemental nutrition via a Nasojejunal or parenteral route. The radiographic feature of greatest importance to recognize in this phase is the development of necrotizing pancreatitis on CT imaging. Two types of

pancreatitis are recognized on imaging as interstitial or necrotizing based on pancreatic perfusion. CT imaging with IV contrast is best evaluated 3–5 days into hospitalization if patients are not responding to supportive care to assess for local complications such as necrosis. [5]

11. It is important to recognize that 85–90% of cases of acute pancreatitis are self-limited and subside spontaneously, usually within 3–7 days after onset, and do not exhibit organ failure or local complications. The management of acute pancreatitis begins in the emergency ward. After a diagnosis has been confirmed, early and aggressive fluid resuscitation is critical to prevent systemic complications from the secondary systemic inflammatory response. Additionally, intravenous analgesics are administered
12. A targeted resuscitation strategy with measurement of hematocrit and BUN every 8–12 h is recommended to ensure adequacy of fluid resuscitation and monitor response to therapy
13. Severity of acute pancreatitis should be determined in the emergency ward to assist in patient triage to a regular hospital ward or step-down unit or direct admission to an intensive care unit. The Bedside Index of Severity in Acute Pancreatitis (BISAP) is most commonly used for assessment
14. Complication of acute pancreatitis should be monitored closely including local(peripancreatic fluid collection, splanchnic thrombosis), and systemic(ARDS, pleural effusion, atelectasis, hypotension, hypovolemia, DIC, oliguria, ATN, PUD, hypertriglyceridemia, fat necrosis).
15. Patients exhibiting signs of clinical deterioration despite aggressive fluid resuscitation and hemodynamic monitoring should be assessed for local complications, which may include necrosis, pseudocyst formation, pancreas duct disruption, peripancreatic vascular complications.

VI. Conclusion

OP poisoning is associated with 3-25% mortality rate. Mortality rate associated with OP induced acute pancreatitis is around 5-10%. Thus, timely and appropriate management of patients with OP poisoning induced pancreatitis by acute care physicians and primary care physicians can prevent significant mortality and morbidity in these patients.

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