

ORIGINAL RESEARCH**Role of serum amylase, lipase and creatinine phosphokinase level in prognosis of organophosphorus poisoning****Dr. D.C.Kumawat¹, Dr. Niharika Singh², Dr. Sanghmitra Singh³**¹Professor and Dean, Department of General Medicine, Geetanjali medical College and hospital Rajasthan²Third year Junior resident, Department of General Medicine, Geetanjali medical College and hospital Rajasthan³Intern Mahatma Gandhi medical College and hospital Rajasthan**Corresponding author:** Dr. Niharika Singh**Received:** 22-01-2023**Accepted:** 20-02-2023**ABSTRACT****Background:** To evaluate the levels of serum amylase, lipase and creatinine phosphokinase in prognosis of organophosphorus poisoning.**Materials & methods:** A total of 50 subjects were enrolled. Complete demographic and clinical details of all the subjects were obtained. Blood samples were taken and serum amylase, lipase and creatinine phosphokinase levels were evaluated. Correlation of these biochemical variables were assessed with the outcome of organophosphorus substance consumed. Results were subjected to statistical analysis by using the SPSS 23.0 version for statistical analysis. A P value of <0.05 was considered to be statistically significant.**Results:** Mean age of the patients was 25.8 years (27 males and 23 females). Most of the patients were either farmers or housewives. Mean serum amylase among subjects who survived and expired was 96.3 IU/L and 284.8 IU/L respectively. Mean serum lipase among subjects who survived and expired was 94.8 IU/L and 211.7 IU/L respectively. Mean serum creatinine phosphokinase among subjects who survived and expired was 584.7 IU/L and 1574.8 IU/L respectively.**Conclusion:** Serum Amylase, Lipase and Creatine Phosphokinase Levels were significant.**Keywords:** serum amylase, Organophosphorus Poisoning, Creatine Phosphokinase.**Introduction**

Organophosphorus (OP) are insecticides which have been used in agriculture to control weeds, pests, or plants diseases, because of its specific action these OP compounds are useful in crop protection and increased productivity, OP poisoning is one of the major type of poisoning in India. ¹ The OP compounds likely to have more adverse effects in developing countries like India, because it is easily available and people are less aware leading to high morbidity and mortality. ² The OP compounds act by inhibiting acetylcholine esterase enzyme at nerve endings and neuromuscular junction, causing overstimulation of acetylcholine receptors. Signs and symptoms of poisoning are mainly due to muscarinic, nicotinic and central nervous system (CNS) receptor overstimulation. ³ In acute OP poisoning, the severity of poisoning correlates the decrease in pseudo choline esterase activity. Various scoring systems such as Acute Physiology and Chronic Health Evaluation and Simplified Acute Physiology Score are available, but laboratory evaluation plays an important and vital role for confirmation of poisoning, diagnosing the first acute organ damage and assessing the severity of poisoning. In laboratory evaluation of OP poisoning, assessment of plasma cholinesterase is most specific lab test for OP poisoning. ⁴

Manifestation of OP poisoning is categorized as the muscarinic, nicotinic and central nervous system. Overstimulation of muscarinic receptor clinically present with parasympathetic stimulation signs including miosis, bradycardia, and bronchorrhea. The nicotinic signs consists of muscle fasciculation, cramping and weakness, while loss of consciousness, respiratory depression, and seizures are due to central nervous system effects. Diagnosis mainly is based on clinical signs. ⁵ Measurement of plasma

cholinesterase is the most distinct test of OP poisoning. ⁶ Early antagonism of OP poisoning as evidence suggested, is generally associated with better outcomes. ⁷ Increased serum amylase is a well-documented biochemical derangement of OP poisoning which may be due to parasympathetic overstimulation of the pancreas. ⁸ Hence, this study was conducted to evaluate the levels of serum amylase, lipase and creatinine phosphokinase in prognosis of organophosphorus poisoning.

Materials & methods

A total of 50 subjects were enrolled. Complete demographic and clinical details of all the subjects were obtained. Blood samples were taken and serum amylase, lipase and creatinine phosphokinase levels were evaluated. Correlation of these biochemical variables were assessed with the outcome of organophosphorus substance consumed. Results were subjected to statistical analysis by using the SPSS 23.0 version for statistical analysis. A P value of <0.05 will be considered to be statistically significant.

Results

Mean age of the patients was 25.8 years (27 males and 23 females). Most of the patients were either farmers or housewives. Mean serum amylase among subjects who survived and expired was 96.3 IU/L and 284.8 IU/L respectively. Mean serum lipase among subjects who survived and expired was 94.8 IU/L and 211.7 IU/L respectively. Mean serum creatinine phosphokinase among subjects who survived and expired was 584.7 IU/L and 1574.8 IU/L respectively. While comparing the serum levels Amylase, Lipase and Creatine Phosphokinase Level among the patients divided on the basis of outcome, significant results were obtained (p-value<0.05).

Table 1: serum levels of amylase, lipase and creatinine phosphokinase.

Variable	Survived (n=38)	Expired (n=12)	p- value
S. amylase (IU/L)	96.3	284.8	0.00*
Lipase (IU/L)	94.8	211.7	0.01*
Creatinine phosphokinase (IU/L)	584.7	1574.8	0.00*

Figure 1: serum levels of amylase, lipase and creatinine phosphokinase.

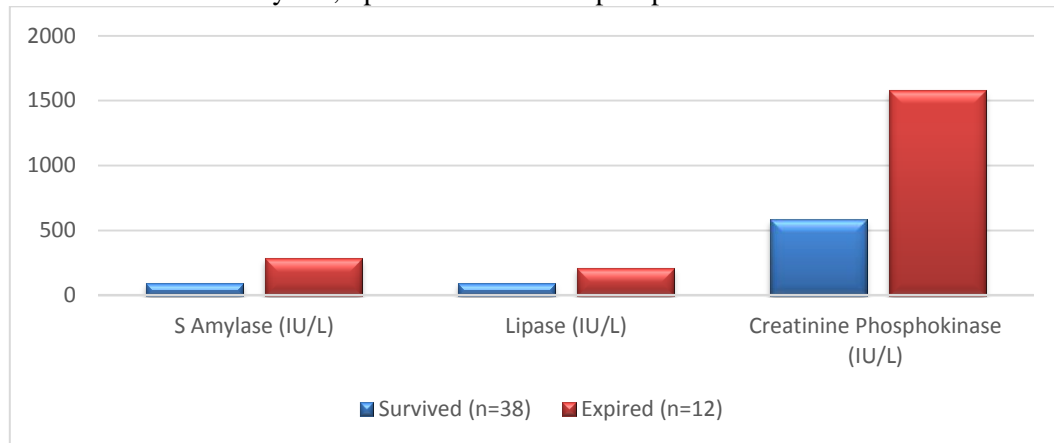


Table 2 : Correlation of plasma cholinesterase with serum amylase and Lipase

Parameters	Plasma cholinesterase	
	Correlation coefficient	P
Serum amylase	-.501	0.01
Serum lipase	-.539	0.01

Plasma cholinesterase was negatively correlated with serum amylase and lipase and it was statistically significant.

Discussion

Organophosphates (OP) have become the most widely used agricultural insecticide worldwide. Suicidal attempt with these easily accessible agents is a major problem in developing countries.⁹ These agents are also used in chemical warfare as nerve agents.¹⁰ OP is absorbed rapidly via the oral, respiratory or transdermal routes and has a high level of morbidity and mortality, especially in developing countries.^{11,12} The mortality rate of self-poisoning in developing countries is 10–20%, mainly caused by respiratory insufficiency secondary to central depression of respiration, muscle weakness, and/or direct lung effects by bronchospasm and bronchorrhea.^{13,14} Oral ingestion of OP pesticides in a suicidal attempt is a major health problem especially in developing countries.¹⁵ Diagnosis and aggressive management of acute poisoning with these lethal substances are required for decreasing morbidity and mortality.^{16,17} Time of antidote administration seems to be a key factor in patient's outcome.¹⁸ Life-threatening intoxication is characterized by altered consciousness, seizure, urinary incontinence, and respiratory suppression. Respiratory failure is a most common complication and cause of death.¹⁶ Hence, this study was conducted to evaluate the levels of serum amylase, lipase and creatinine phosphokinase in prognosis of organophosphorus poisoning.

In our study, Mean age of the patients was 25.8 years (27 males and 23 females). Most of the patients were either farmers or housewives. Mean serum amylase among subjects who survived and expired was 96.3 IU/L and 284.8 IU/L respectively. Mean serum lipase among subjects who survived and expired was 94.8 IU/L and 211.7 IU/L respectively. Mean serum creatinine phosphokinase among subjects who survived and expired was 584.7 IU/L and 1574.8 IU/L respectively. While comparing the serum levels Amylase, Lipase and Creatine Phosphokinase Level among the patients divided on the basis of outcome, significant results were obtained (p-value<0.05). In our study, plasma cholinesterase was negatively correlated with serum amylase and lipase and it was statistically significant.

Sumathi ME et al, conducted a study on 53 subjects of acute OP poisoning admitted in emergency unit of a tertiary care rural hospital. Subjects of either gender of all age-groups were included in the study. On admission, plasma cholinesterase, serum amylase, lipase and CPK were measured. Based on plasma cholinesterase activity at the time of admission, subjects were divided into three groups. Group I-having 20-50% of plasma cholinesterase activity; Group II-10-20% of plasma cholinesterase activity; and group III-<10% of plasma cholinesterase activity. Serum amylase, lipase and CPK were negatively correlated with plasma cholinesterase levels. Serum amylase showed statistically significant negative correlation with plasma cholinesterase. Serum amylase showed the highest diagnostic accuracy for assessing severity of poisoning followed by CPK and Lipase.¹⁹

Dungdung A et al, conducted hospital-based observational study on 100 subjects of acute OP poisoning. Subjects of either gender of all age-groups were included in the study. On admission, plasma cholinesterase, serum amylase, and serum lipase were measured. Based on plasma cholinesterase activity at the time of admission, subjects were divided into three groups. Group I-having 20-50% of plasma cholinesterase activity; Group II-10-20% of plasma cholinesterase activity; and Group III <10% of plasma cholinesterase activity. Among 100 patients it was seen that serum amylase and serum lipase were negatively correlated with plasma cholinesterase levels and it was statistically significant. It was seen that serum amylase had the highest diagnostic accuracy for assessing severity of poisoning, 10 deaths were there in which 6 had <10% of plasma cholinesterase activity, 8 out of these 10 patients had elevated amylase level.²⁰

Acute OP poisoning often presents in medical emergency requiring urgent monitoring and treatment in intensive care unit. Management of OP poisoning depends on its clinical severity as well as laboratory evaluation, mechanism of toxicity in OP poisoning is inhibition of cholinesterase. Assessing the level of acetylcholinesterase (AChE) and butyrylcholinesterase (BChE)/plasma cholinesterase are the screening tools for OP poisoning. Plasma cholinesterase is the most widely used laboratory test for diagnosis and prognosis of OP poisoning as compared to AChE in erythrocytes which is more specific.²¹

Conclusion

Serum Amylase, Lipase and Creatine Phosphokinase Levels were significantly enhanced among patients who expired, thus establishing their role as significant prognostic markers among patients with Organophosphorus Poisoning.

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