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Study of serum amylase levels in Organophosphorus Poisoning patients in a tertiary care hospital in Kolar

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ABSTRACT

Background: One significant prognostic indicator of OP poisoning may be serum amylase. The degree of poisoning was previously determined by measuring the plasma cholinesterase level. Serum amylase is currently advised as a more accurate measure of severity. The purpose of this study is to ascertain whether serum amylase levels are related to the patient's presentation and outcome.

Material and Methods: Fifty individuals who were admitted with a history of organophosphorus poisoning participated in a cross-sectional study. Along with other standard tests such as CBC, RFT, LFT, serum pseudocholinesterase, thyroid profile, chest X-ray, USG Abdomen Pelvis, and PFT, the serum amylase level was assessed in 50 individuals who had a history of exposure to organophosphorus substances. Using the Peradeniya Organophosphorus Poisoning (POP) scale and additional variables such as ICU stay/need for a ventilator, discharge/death, and others, the prognosis and clinical outcome of the patients were evaluated.

Results: It was statistically significant that the mean POP score for recovered cases was 1.57 and for dying cases it was 5.5. The recovered group's mean serum amylase levels were 50.63, while the deceased group's were 205.4. At the level of serum amylase of 100.55, the sensitivity was 86.667% and Specificity was 100%.

Conclusion: The results showed a substantial correlation between serum amylase levels and death in cases of OP poisoning.

Keywords: *OP poisoning, Serum Amylase, POP Score, Severity of poisoning, Mortality*

1. INTRODUCTION

Organophosphorus compounds (OPC) are commonly used as pesticides not only in agriculture and horticulture but also in households for control of vector-borne diseases such as malaria, dengue, etc. The most common organophosphate (OP) compound used for poisoning is *Metacid.*[1]

Serum amylase could be an important prognostic marker of OP poisoning.[1] Earlier plasma cholinesterase level was used to assess the severity of poisoning. Presently serum amylase is being recommended as a better indicator of severity.[2] Neurologic, cardiac, and respiratory complications are the main causes of morbidity and mortality in these patients. The involvement of other systems can also occur but it is very uncommon.[3] There are limited literatures studying the pancreatic involvement in organophosphate (OP) poisoning using biochemical means.[1] The pathogenesis of pancreatic change after OP intoxication was considered to be pancreatic ductal hypertension and stimulation of exocrine pancreatic secretion due to excessive cholinergic stimulation of pancreas by OP compounds. The elevation of serum amylase is not highly specific for pancreatic disease. Serum amylase may be elevated secondary to various disorders including salivary gland disease. One can speculate that the hypersalivation commonly observed in OP poisoning caused elevated serum amylase of salivary origin, because hypersalivation can cause elevated serum amylase that consisted exclusively of salivary pattern.[4]

Several studies[5, 6] showed that elevated serum amylase levels (hyperamylasemia) are associated with clinical severity and poor outcome. Considering this fact the present study was undertaken to estimate serum amylase levels in acute organophosphate poisoning and correlated with outcome of patient. This study focuses on determining the association of serum amylase levels with the patient's presentation and outcome.

2. MATERIAL AND METHODS

A cross sectional study was undertaken among 50 patients admitted with a history of organophosphorous poisoning with clinical features and physical evidence of poisoning for a period of 3 months. Clearance from institution ethics committee was obtained before the study was started. An informed consent was obtained from all the patients before including them in to the study. Patients with history of organophosphorous poisoning with clinical features and physical evidence of poisoning were included in to the study. Patients with exposure of compound other than OP, with indication of exposure to multiple poisons, who consumed poison with alcohol, chronic alcoholics, with ultrasound abdomen suggestive of acute pancreatitis and/ or gall stone disease, patients with known parotic or other salivary gland disorders were excluded from the study.

Among the 50 patients with a history of exposure to organophosphorus compounds, the serum amylase level was measured along with other routine investigations like CBC, RFT, LFT, serum pseudocholinesterase, thyroid profile, chest X ray, USG Abdomen pelvis and PFT. Prognosis and clinical outcome of patients was assessed by using with Peradeniya organophosphorus poisoning (POP) scale[4] and other factors like ICU stay/ need of ventilator, discharge/death.

The data thus obtained was compiled and analyzed using Statistical Package for social services. Receiver operating characteristic curves (ROCs) was constructed for serum amylase and mortality. Receiver operating characteristic (ROC) and optimal cut-off points were chosen for the calculation of sensitivity, specificity, positive and negative predictive values. A test that predicts an outcome no better than chance has an area under the ROC curve of 0.5. An area under the ROC curve above 0.8 indicated fairly good prediction.

3. RESULTS

Table 1. Demographic pattern of the study group

Characteristics		**Frequency**	**Percent**
Age group	**Less than 20 years**	10	20.0
	21 – 40 years	29	58.0
	41 – 60 years	11	22.0
Sex	**Male**	33	66.0
	Female	17	34.0
Marital status	**Married**	31	62.0
	Unmarried	19	38.0
Time elapsed between consumption to presentation to hospital	**Less than 1 hour**	4	8.0
	2 hours to 6 hours	41	82.0
	More than 6 hours	5	10.0

This study had shown that about 58.0% of the cases belonged to 21 – 40 years. Majority of the cases were males and married. The time elapsed between consumption to presentation to hospital was 2 to 6 hours.

Table 2. Clinical characteristics in this study group

Mean ± SD	**Outcome**		**T value**	**P value, Sig**
	Recovered	**Died**		
Total score (POP score)	1.57 ± 1.2	5.5 ± 1.8	9.159	0.000, Sig
Serum amylase levels	50.63 ± 21.6	205.4 ± 105.8	8.364	0.000, Sig

Duration of stay in ICU	3.46 ± 4.8	4.6 ± 6.1	0.707	0.483, NS
Duration of stay in Hospital	5.1 ± 6.0	4.6 ± 6.2	0.275	0.784, Sig

Mean POP score in died cases was 5.5 and recovered cases was 1.57 and it was statistically significant. Mean Serum amylase levels was 50.63 in recovered group and 205.4 in died group. The duration of stay in ICU was 3.46 days in recovered group and 4.6 days in died group. The duration of stay in hospital was 5.1 days in recovered group and 4.6 days in died group.

Chart 1. ROC curve of Serum amylase with ouctome

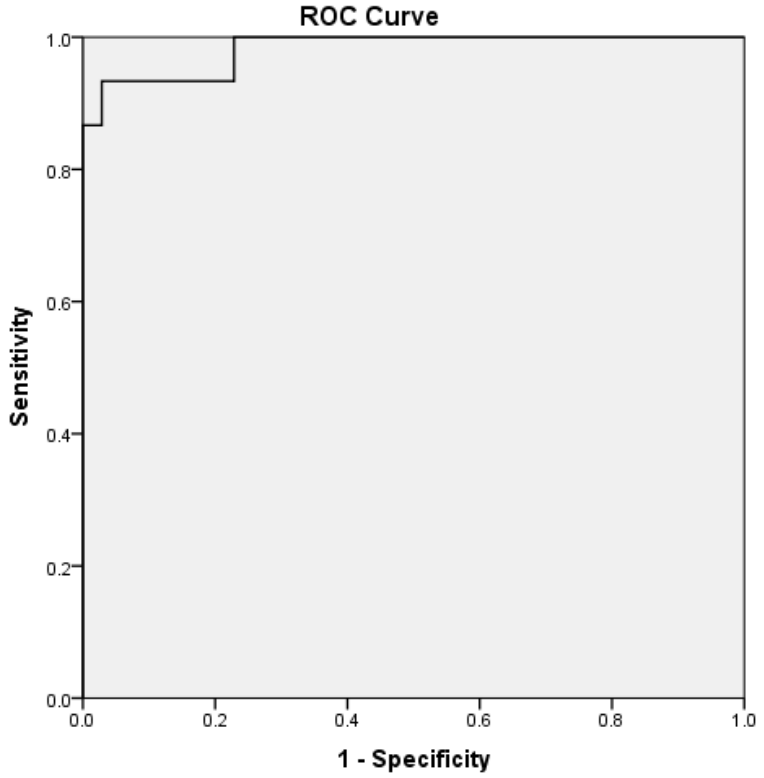

Table 3. Area under curve in the study group

Area Under the Curve

Test Result Variable(s): SERUM AMYLASE

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.983	.016	.000	.951	1.000

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

The area under curve in the study group was 0.983 indicating 98.3% of the sensitivity and specificity was under the curve.

Table 3. Sensitivity and specificity in the study group

Test Result Variable	Positive if greater than or equal to	Sensitivity	Specificity
Serum amylase level	12.99	100	0
	41.0	100	40
	69.725	100	77.1
	87.4	93.33	97.14
	100.55	86.667	100

At the level of serum amylase of 100.55, the sensitivity was 86.667% and Specificity was 100%.

4. DISCUSSION

This study was undertaken in order to study the serum amylase levels in Orgnophosphorous poisoning.

According to this study, approximately 58.0% of the cases ranged in age from 21 to 40 years. In a research by Malaviya et al[7], the majority of the cases were under the age of 20. Mevada et al found that the majority of the patients were between the ages of 25 and 40.[8]

The majority of the patients were male and married. According to Malaviya et al, 42.8% of the participants were male.[7] Mevada et al found a male-to-female ratio of 1.58:1.[8]

The time between ingestion and hospitalization ranged from 2 to 6 hours. The average POP score in died patients was 5.5, while in recovered cases it was 1.57, which was statistically significant. Mean Serum amylase levels was 50.63 in recovered group and 205.4 in died group. The duration of stay in ICU was 3.46 days in recovered group and 4.6 days in died group. The duration of stay in hospital was 5.1 days in recovered group and 4.6 days in died group. According to Dubey et al, mean amylase levels were 56.0 in cases with mild POP scores, In intermediate, and 188 in severe POP cases. Approximately 44.4% of individuals with serum amylase levels more than 80 mg/dl required a ventilator.[8] Patil et al. found that the mean serum amylase level was 376.03 U/L. The average blood amylase level was 335.4 U/L in discharged cases and 843.4 U/L in dying cases.[10] In a research by Mevada et al, the ICU stay was 5 days or less.[8]

The area under curve in the study group was 0.983 indicating 98.3% of the sensitivity and specificity was under curve. Majority of the patients were male and married. The time between ingestion and hospitalization ranged from 2 to 6 hours. At blood amylase levels of 100.55, the sensitivity was 86.667% and the specificity was 100%.

5. CONCLUSION

The data revealed that, Serum amylase levels were significantly associated with mortality in OP poisoning cases.

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