

Original research paper

The levels of serum amylase in organophosphorus poisoning cases: clinical descriptive study

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Abstract

In Organophosphorus poisoning raised serum amylase (hyperamylasemia) level is secondary to pancreatic injury because of parasympathetic overstimulation and hypersecretion. There have been studies showing that elevated serum amylase on admission day was related to the development of respiratory failure need for ventilatory support and increased mortality. Observation method of primary source of information in the department of general medicine. Secondary source of information from published articles, journals, books, case sheets, discharge summary, related websites are used in planning, developing, synopsis and during dissertation as supporting document. In our study, mean AMYLASE levels in mild poisoning is 114.23, in moderate it is 312.77 and in severe it is 774.66.

Keywords: Serum amylase, organophosphorus poisoning, hyperamylasemia

Introduction

Organophosphorus compound, a common pesticide used in agriculture for crop protection and pest control, is often implicated in accidental and suicidal poisoning in India.

World Health Organization (WHO) estimates that around 0.3 million people die every year globally due to various poisonings ^[1] and pesticide poisonings causes more than 2,20,000 deaths in developing countries like India ^[2] because of cheap and easy availability of highly hazardous pesticides. In many Indian reports, the rates of poisoning as suicidal method range from 20.6% (10.3% organophosphorus) to 56.3% (43.8% organophosphorus) ^[3,4].

Organophosphorus (OP) compounds causes over stimulation at cholinergic synapses by inhibiting acetyl cholinesterase and butyryl cholinesterase enzymes ^[5] Measuring serum cholinesterase level in blood is a gold standard for diagnosis of organophosphorus poisoning as its level decreases in OPC poisoning ^[6]. However, because of wide inter-individual variability, significant depression of the enzyme cholinesterase activity may occur but still fall within the "normal" range ^[7].

Serum enzymes EChE or BChE measurement is not available regularly in all laboratories and is costly so new cheaper and easily quantifiable biochemical markers are needed in relation to OP poisoning like serum amylase ^[8]. In organophosphorus poisoning raised serum amylase (hyperamylasemia) level is secondary to pancreatic injury because of parasympathetic overstimulation and hypersecretion. There have been studies showing that elevated serum amylase on admission day was related to the development of respiratory failure need for ventilatory support and increased mortality ^[9].

Methodology

- Observation method of primary source of information in the department of general medicine. Secondary source of information from published articles, journals, books, case sheets, discharge summary, related websites are used in planning, developing, synopsis and during dissertation as supporting document.
- Sample size was estimated based on the formula $4pq/d^2$ where p is the prevalence of Community acquired pneumonia in hospital for one year and $q = 1-p$ and $d=1.5$. It will come to 97 and it was rounded off to 100.

Inclusion criteria

- Subjects who give written informed consent.
- Subjects aged more than 18 years.
- Subjects admitted with history of acute organophosphorus compound poisoning.

Exclusion criteria

- Patients with indication of exposure to an entirely different poison other than OP poison.
- Patients with double poisoning.
- Patients who have consumed poison along with alcohol.
- Patients who are chronic alcoholics.
- Patients who are confirmed cases of biliary tract disorders.
- Patient who are known case of pancreatic disorders.
- History of intake of drugs likely to produce pancreatitis. i.e. azathioprine, mercaptopurine, thiazides, frusemide, pentamidine.

Data analysis

- Statistical analysis was performed using statistical software package SPSS Version 20.
- The non-parametric t-test and ANOVA test were applied in comparative analysis results between different groups and to find significance (p) values.
- Mean values, standard deviation was assessed wherever relevant.

Results

In our study, mean serum pseudocholinestrase levels in mild category is 2876.54 ± 1215.22 , moderate is 1259.32 ± 976.33 , severe is 508 ± 203.2 . P value is 0.001, which is statistically significant.

Table 1: Mean serum pseudocholinestrase values according to severity score

Severity	Pop scores	Serumpseudocholinestrase
Mild	0-3	2866.54 ± 1225.11
Moderate	4-7	1249.32 ± 866.31
Severe	8-11	518 ± 224.2

Table 2: Mean Serum amylase values and POP scoring

Severity according to POP score	Day 1 amylase values (Mean \pm SD)	Day 3 amylase values (Mean \pm SD)	Day 5 amylase values (Mean \pm SD)
Mild	65.23 ± 65	170.2 ± 103	107 ± 72
Moderate	230.77 ± 76	385.6 ± 233	321.3 ± 101
Severe	447.66 ± 149.1	825.4 ± 412	1050 ± 546

Table 3: Intermediate syndrome

Severity according to POP score	No. of subjects	Ventilator support
Mild	5	4
Moderate	2	2
Severe	0	0

In our study, total 7 patients went for intermediate syndrome, in that 5 patients were in mild group, 2 patients in moderate group.

Table 4: Mean amylase values in intermediate syndrome

Type of compound	Day 1 amylase	Day 3 amylase	Day 5 amylase
Malathion	118.6 ± 143.2	190.1 ± 135	262.1 ± 181.2
Dimethoate	145.9 ± 101	206.5 ± 147.3	301.3 ± 236
Parathion	99.8	163.7	247.1
Dichloroovas	133	202.2	263

The mean AMYLASE values in 3 different days are listed according to the type of compound consumed. P value is 0.005, which is statistically significant.

Discussion

Table 5: Table showing mean serum pseudocholinesterase values in each POP severity scale

	Dubey <i>et al.</i> ^[10]	Koiral <i>et al.</i> ^[11]	Present study
Pop Scoring	Mean serum pseudo cholinesterase levels		
Mild	5834	2389.1	2876.54 ± 1215.22
Moderate	2077	1104.4	1259.32 ± 976.33
Severe	607	237.5	508 ± 203.2

In our study, mean pseudocholinesterase level in mild poisoning is 2876.54, in moderate it is 1259.32 and in severe it is 508.

Table 6: Table showing mean serum Amylase values in each POP severity scale

	Dubey <i>et al.</i> ^[10]	Koiral <i>et al.</i> ^[11]	Present study
Pop Scoring	Mean serum amylase levels		
Mild	89.1	156.75	114.23 ± 65
Moderate	273.0	526.42	312.77 ± 76
Severe	688.8	1269.8	774.66 ± 149.1

In our study, mean AMYLASE levels in mild poisoning is 114.23, in moderate it is 312.77 and in severe it is 774.66

Table 7: Amylase values on day 1, day 3, day 5 comparison

Severity	Day 1		Day 2		Day 3	
	Present Study	Koiral <i>et al.</i> ^[11]	Present Study	Koiral <i>et al.</i> ^[11]	Present Study	Koiral <i>et al.</i> ^[11]
Mild	65.23±65	62±72	170.2±103	295. ±382	107±72	120±50
Moderate	230.77±76	245±91	385.6±233	935±731	321±101	409±226
Severe	447.66 ±75.1	896 ±199	825.4 ±206	1178 ±425	1050±224	1400±620

- In our study, we found that high initial AMYLASE level is associated with more chances of mortality. We observed that mean AMYLASE levels was highest in death group on all 3 days.
- Mean AMYLASE levels had come down to around 100 IU/L in the first group whereas it was still elevated in the severe group patients and in those who died.
- In our study, we found that high initial serum AMYLASE levels is associated with severe degree of poisoning and is associated with complications and mortality [12].
- We also found that AMYLASE levels normalises by day 5 in uncomplicated cases but continues to be high in complicated cases. The results were statistically significant.

Conclusion

Serum AMYLASE values rise during 1st and 3rd day of consumption and fall after 4-5 days in mild to moderate poisoning and values remain high on day 5 in severe cases and in cases of intermediate syndrome.

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