

ORIGINAL RESEARCH

A STUDY ON SERUM AMYLASE LEVELS IN ACUTE ORGANOPHOSPHOROUS POISONING

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Abstract

INTRODUCTION: Poisoning by organophosphorous Pesticides (OP) has reached epidemic proportions in most parts of the world, particularly in developing agrarian countries, where the toxicity of available poisons and paucity of appropriate medical facilities ensure a high fatality rate.

AIM OF THE STUDY: To estimate serum Amylase levels in acute organophosphorous compound poisoning. To find out its relationship with clinical severity and outcome

MATERIALS AND METHODS: Patients presenting with Organophosphorous poisoning were the study subjects. Patients with organophosphorous compound poisoning admitted to the hospital during the study period, 100 were included in the study. Mahatma Gandhi Memorial Hospital, Warangal Telangana (MGMH) March 2018 To October 2019 For A Period Of 20 Months.

OBSERVATION AND RESULTS: In my study The incidence was higher (40%) in the age group of 21-30 followed by (36%) in the age group of 31-40. In DR.M.G.R university study, the incidence was similarly higher 40% in (%) in the age group of 21-30 followed by 36% in the age group of 31 to 40.

CONCLUSION: Of the 100 patients in our study 33 patients (33%) had normal serum amylase level ; 67 patients (67%) had elevated serum amylase level which is very significant.

KEYWORDS: Amylase; organophosphorous

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INTRODUCTION

Poisoning by organophosphorous Pesticides (OP) has reached epidemic proportions in most parts of the world, particularly in developing agrarian countries, where the toxicity of available poisons and paucity of appropriate medical facilities ensure a high fatality rate. Their access and social-cultural factors play an important factor in choice of OP as a self-poison and the incidence is more in young age group with a common fatality ratio of 20% [1&2] According to WHO, worldwide estimates of pesticide poisoning number 3 million each year among them 2 million hospitalized from suicide attempts and 2,20,000 deaths, the majority of which are actually intentional. Poisoning due to occupational exposure, accounted for about one fifth of the incidents, with a fatality ratio of less than 1%. More than 90% of the non occupational incidents were suicidal, with a fatality rate

more than 10% and the majority of the subjects are young males. Accidental exposures accounted for 8-10% of the incidents and homicidal use (less than 1%) were other forms of poisoning. The reported over all mortality following OP insecticide poisoning varies from 4-30% in different countries and institutions [3] In India, OP compounds cause more self-poisoning deaths in southern and central India. In Northern India, aluminum phosphide causes most deaths with a fatality ratio over 90%. Other Pesticides used for self-poisoning include carbamates, Organochlorines and pyrethroids. [4] Organophosphorous compounds are principally used as pesticides, and their exposure is highly prevalent in developing countries. Toxic effects of OPs are associated with significant morbidity and mortality and are a major global clinical problem. Occupational, suicidal (or) homicidal exposure to OPs produces a characteristic but treatable syndrome in

humans thus, early recognition and timely intervention of toxicity from these compounds are of great importance, to emergency physicians and patients. Case reports on acute pancreatitis following acute organophosphorus compound ingestion has been reported now and then, but regular studies with reference to Pancreatitis is not available in a serial manner. Hence an attempt was made to study Pancreatic involvement through biochemical means.

AIM OF THE STUDY

To estimate serum Amylase levels in acute organophosphorus compound poisoning. To find out its relationship with clinical severity and outcome

MATERIALS AND METHODS

Subjects: Patients presenting with Organophosphorous poisoning were the study subjects.

Study design: A case control study.

Study setting: MAHATMA GANDHI MEMORIAL HOSPITAL, WARANGAL
TELANGANA (MGMH)

Study duration: March 2018 to October 2019 for a period of 20 months.

Materials: Patients with organophosphorus compound poisoning admitted to the hospital during the study period, 100 were included in the study.

Study criteria

Inclusion criteria

100 patients with a history of exposure to OP poison were the study subjects.

Exclusion criteria

Patients with indication of exposure to an entirely different poison other than OP poison. Patients with mixed poisoning, Patients who have consumed poison along with alcohol, Patients with history suggestive of gall stone disease, Patients with known history of lipid disorders, History suggestive of parotid gland disease, Patients with history of lipid disorders, Patients with history of renal or hepatic disease, History of renal or hepatic disease, History of intake of drugs likely to produce pancreatitis, Azathioprine, 6-Mercaptopurine, Frusemide and Pentamidine. Patients admitted in MGMH were the study group. A previously designed proforma was used to collect the demographic and clinical details of the patients.

Sample collection

100 Patients satisfying the inclusion criteria were selected for the study. About 3 ml of venous blood were collected from each subject within 24 hours of consumption of poison. The samples were centrifuged at 3000 rpm for 15 minutes. The supernatant serum was separated and frozen. Serum Amylase was estimated with the help of CNP-G3 method Autoanalyser AUTOPAK.

OBSERVATION AND RESULTS

AGE DISTRIBUTION OF CASES AND CONTROLS AMONG STUDY POPULATION

| AGE GROUPS IN YEARS | CASES Number | % | CONTROLS Number | % |
|---|-----------------|--------------|--------------------|--------|
| UPTO 20 | 13 | 13.0% | 15 | 30.0% |
| 21 TO 30 | 40 | 40.0% | 40 | 40.0% |
| 31 TO 40 | 36 | 36.0% | 35 | 20.0% |
| 41 ABOVE | 11 | 11.0% | 10 | 10.0% |
| Total | 100 | 100.0% | 100 | 100.0% |
| MEAN | MEAN 29.4 | MEAN 32.3 | | |
| p VALUE 0.97677812, NON SIGNIFICANT | | | | |

GENDER DISTRIBUTION AMONG CASES AND CONTROLS

| CASES | CONTROLS | | | |
|--|----------|---------|--------|---------|
| ENDER | Number | % | Number | % |
| Male | 63 | 63.00% | 70 | 70.00% |
| Female | 37 | 37.00% | 30 | 30.00% |
| Total | 100 | 100.00% | 100 | 100.00% |
| P value- 0.2942661, NOT SIGNIFICANT | | | | |

GENDER DISTRIBUTION AMONG CASES AND CONTROLS

| PARAMETER | CASES Mean | CONTROLS Mean |
|---------------------|---------------|------------------|
| Blood Sugar | 95.1mg/dl | 102.3 mg/dl |
| Blood Urea | 29.7mg/dl | 31.4 mg/dl |
| serum Creatinine | 1mg/dl | 0.8 mg/dl |

INCREASED AMYLASE LEVELS IN FIRST 24 HOURS IN STUDY POPULATION

| AMYLASE LEVELS IN | NORMAL Number | % | INCREASED Number % |
|--|------------------|----|-----------------------|
| CASES | 33 | 33 | 67 67 |
| CONTROLS | 95 | 95 | 5 5 |
| The chi-square statistic is 83.4201. The p-value is < .00001. The result is significant at p < .05 | | | |

Table: Reason for poisoning

| Reason for poisoning | Dr.M.G.R.medical university | My study |
|----------------------------|--------------------------------|-------------|
| Familial | 65% | 66% |
| Financial | 25% | 25% |
| Job stress | 5% | 4% |
| Others | 5% | 5% |
| Total | 100 | 100 |

Like in DR,M.G.R university study , commonest modes of suicidal poisoning which accounted for 100 in our study. In that familial stress was for 66%. After family stress most common reason for poisoning were financial problem.

| AGE GROUP IN YEAR | Dr. M.G.R. MEDICAL UNIVERSITY | MY STUDY |
|-------------------------|-------------------------------------|-------------|
| UP TO 20 | 12.50% | 13% |
| 21 TO30 | 40% | 40% |
| 31 TO40 | 35% | 36% |
| 41 AND ABOVE | 12.50% | 11% |
| TOTAL | 100 | 100 |

In my study The incidence was higher (40%) in the age group of 21-30 followed by (36%) in the age group of 31-40. In my study The incidence was higher (40%) in the age group of 21-30 followed by (36%) in the age group of 31-40.

DISCUSSION

Organophosphates and Carbamates are frequently used pesticides which can produce life-threatening intoxication. All these compounds act by irreversible inactivation of acetylcholinesterase (AChE). The clinical symptoms range from the classic cholinergic syndrome to flaccid paralysis and intractable seizures. About 99% of fatal poisoning occurs in developing countries, particularly among farm workers. Despite an increased incidence of organophosphorous insecticide poisoning, the exact micro molecular changes that take place remain elusive. Till date, atropine and oxime continue to occupy the prime position in the specific management of OP poisoning. With the ease of availability, it is not surprising that the use of OP compounds in suicide attempts has mushroomed from a disturbing early trend to being one of the commonest modes of suicidal poisoning which accounted for 100% in our study. This rate was consistent with the findings of Mahadi Balali Mood et al (94.3%) whereas it was reported to be 67% by AM Saadeh et al. The vast majority of poisonings followed oral ingestion of liquid form and almost for all the patients gastric lavage was immediately done. The most common reason for consumption in our study was found to be the familial stress (66%) followed by financial stress (25%). Monocrotophos accounted for about 53% of intoxication. A similar study conducted at the tamilnadu dr.m.g.r.medical university chennai, tamilnadu.

Clinical symptoms

The accumulation of AChE in nerve terminals, results in continued stimulation with subsequent paralysis of receptors and accounts for the clinical signs of muscarinic, nicotinic and CNS effects. Both the present study, and the study by Mahdi Balali-Mood et al [38], found association between the severity of poisoning and clinical manifestations. The most marked muscarinic signs in our study population were, miosis (55%), excessive secretions (59%), and respiratory distress (27%). The most prominent of the nicotinic effect is muscular end plate block, resulting in muscle weakness and fasciculations (31%). The CNS symptoms, like depressed mental status was found in (28%) patients. Similar findings have also been reported by Murat Sungur et al. The Mean amylase levels in DEAD OP POISONING patients in my study was 209 which were Higher than ALIVE were 119 u/l. The Mean amylase levels in DEAD OP poisoning patients in shri vastrao naik study was 482.3 which were Higher than ALIVE were 148 u/l. The Mean amylase levels in DEAD OP poisoning patients in Dr. MGR university study was 213 u/l which were Higher than ALIVE were 134 u/l. A similar finding seen in a cross sectional study was conducted in Shri Vasantrao Naik Government Medical College and Hospital, Yavatmal between 1st January 2017 to 30th November 2017. out of 120 patients with

organophosphorus poisoning admitted to the hospital. the amylase levels were significantly elevated at the time of admission (178.21 U/L) and have shown a gradual remission with proper treatment. The mean amylase level in severely poisoned patients was 294.8 U/L. The bad prognostic factors, very well correlated with serum amylase levels were Pinpoint pupil- 297 U/L, Fasciculations-309 U/L, Severe secretions-321 U/L, CNS depression-334 U/L, Respiratory failure-359 U/L and Convulsions-398 U/L. The overall mean value of serum amylase was significantly higher in nonsurvivors Vs survivors (482.46 U/L Vs 148.34 U/L, $p < 0.0001$). Serum amylase levels may be considered as a marker of Organophosphorous intoxication, since it enables the early recognition of severity and to identify those at risk of developing the complications of Organophosphorous poisoning.

Respiratory Depression

The most troublesome complication of OP poisoning was respiratory depression which could be due to reasons such as: aspiration of gastric contents, excessive secretions, pneumonia and septicemia complicating adult respiratory distress syndrome. Of the 100 patients, respiratory depression was observed in 27 (27%) cases. Early recognition of respiratory failure, prompt endotracheal intubations and mechanical ventilation are life saving in severe OP poisoning.

CONCLUSION

Of the 100 patients in our study 33 patients (33%) had normal serum amylase level ; 67 patients (67%) had elevated serum amylase level which is very significant. The mean Amylase level in first 24 hours of OP poisoning was 145.05 U/L which is significantly higher than the control groups. The bad bedside prognostic factors which correlated very well with serum Amylase levels in the order of increasing severity include

- i. Convulsions (amylase 156 u/l)
- ii. Pupil constriction (208U/L)
- iii. Severe secretions (245 U/L)
- iv. CNS depression (259.9 U/L)
- v. Fasciculations (273.1U/L)
- vi. Respiratory failure (292U/L)

Hence Serum amylase levels may be considered as a marker of Organophosphorous intoxication, since it enables the early recognition of severity and also helps to identify those at risk of developing the complications of Organophosphorous poisoning. Our study also showed that there was a significant correlation between markedly elevated Amylase level and respiratory failure and therefore poor outcome. A significant rise in Serum Amylase level also portends various complications that include convulsions, CNS depression, fasciculations and respiratory failure.

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