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A PROSPECTIVE STUDY OF SERUM AMYLASE LEVELS IN ACUTE ORGANOPHOSPHOROUS POISONING AND ITS RELATIONSHIP WITH ITS SEVERITY AND OUTCOME

General Medicine

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ABSTRACT

Introduction: Acute poisoning by organophosphosphorous Pesticides (OP) has reached epidemic proportions in most parts of the world, particularly in developing countries, where the toxicity of available poisons and paucity of appropriate medical facilities ensure a high fatality rate. Their ease of access and socio–cultural factors plays important role in choice of OP as a self-poison and the incidence is higher in young economically active group with a common fatality ratio of 20%. 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. **Aims and Objectives Of The Study:-**To estimate serum amylase levels in acute organophosphorus compound poisoning& to findout its relationship with Clinical severity and Outcome. **MATERIAL AND METHODS: 1. STUDY DESIGN:** An Analytical - A prospective Study, which was conducted through clinical examination and laboratory investigation, in a tertiary health care center. **2. PERIOD OF STUDY:** The study was conducted for a period of 1 Year, i.e., 2018 to 2019. 3. STUDY AREA: The study was conducted in the department of General Medicine, AlluriSitaramaRaju Academy of Medical Sciences, Eluru, West Godavari district, Andhra Pradesh.**Results:**The majority of poisonings followed oral ingestion of liquid form.The incidence was higher (40%) in the age group of 21-30 followed by (35%)in the age group of 31-40.The most common reason for consumption was found to be the familial stress (65%) followed by financial stress (25%).Methyl parathion accounted for about 52.5% of intoxication .The commonest mode of intake was found to be poison along with water (67.5%)..The most troublesome complication was respiratory depression. **Conclusions:**In India, organophosphorus compounds cause more suicidal deaths among the earning and nonearning members of the society.The study showed that there was a significant correlation between markedly elevated amylase level and respiratory failure and therefore poor outcome.

KEYWORDS

Organophosporus(OP) Compounds, Serum Amylase, Pancreatitis.

INTRODUCTION:

Organophosphorus (OP) compounds are commonly used as pesticides. Pesticides aredesigned to kill various pests. They are used in most countries around the world to protectagricultural and horticultural crops againstdamage. They are used at home and at work toassure a pestfree environment. Insecticides are themost commonly encountered pesticides in thedeveloping countries; herbicides are morecommonly encountered in developed countries.The importance of pesticides in India can beunderstood from fact that agriculture is majorcomponent of Indian economy. Incidence ofpoisoning by pesticides and consequentadmission to the hospital has been increasing inrecent decades2. In India OPC intake is the commonest method of suicide (40.5%) after hanging (49%). Hospital-based data suggest that barbiturates and copper sulfate were the commonly used agents for suicide in the years, 1972-1977; however,later they were replaced by OP compounds and aluminium phosphide. Organophosphorus insecticides are responsible for as much as 75% of all poisonings in our country today.

OP ranks the foremost in thelist of agents which cause acute pesticidepoisoning. Causes of poisoning are suicidal,accidental and homicidal2. Suicidal poisoningis the most common cause in developing countriesbecause of its cheapness and easy availability inthe market.

Acute poisoning by organophosphorus pesticides (OP) has reached epidemic proportions, particularly in developing countries, where the toxicity of available poisons and paucity of appropriate medical facilities ensure a high fatality rate. Their ease of access and socio-cultural factors plays important role in choice of organophosphates as a self-poison. OP compounds inhibit the enzyme acetylcholinesterase leading to accumulation of acetylcholine, which binds to muscarinic and nicotinicreceptors throughout nervous system. Signs andsymptoms of OP poisoning are due to persistentacetylcholine hyperstimulation at muscarinic andnicotinic receptor sites[4].

The gastrointestinal symptoms following Organophosphorus compoundpoisoning are excessive salivation, nausea, vomiting, abdominal pain and diarrhoea. Both in experimental studies11,12 and in humans exposed to these compounds pancreatic damage has been reported. Pancreatic injury in humans may be painless13 and marked by hyperamylasemia, elevated serumlipase,hyperglycemia and glycosuria. Occasionally, symptomatic acute pancreatitis can occur14 . The incidence of the latter varies from 7–22% depending on type of study and compound.

There are two forms ofcholinesterases, one is true cholinesterase oracetyl cholinesterase which it is located in theerythrocytes, neuromuscular junctions and greymatter of brain, while another one ispseudocholinesterase or plasma cholinesterasewhich is synthesized by the liver and found inplasma, pancreas, heart and brain. Both thesetypes of enzymes are inhibited by insecticidepoisoning[5].

Numbers of studies have been donecorrelating serum amylase and organophosphoruspoisoning. No conclusion has been derived as towhether serum amylase levels could be used alongwith cholinesterase levels for monitoring OP poisoning. Till now plasma cholinesterase is the most commonly used biochemical parameter in assessing severity of poisoning hence in this study we intend to know the clinical significance of serum amylase levels in OP poisoning cases at the time of admission in assessing the severity.

Justification:

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.

AIMS and ObjectivesOF THE STUDY:

(i) To estimate serum Amylase levels in acute organophosphorus compound poisoning.

(ii) To find out its relationship with
a) Clinical severity
b) Outcome.

Materials and Methods:
Subjects: Patients who were admitted in the department of General medicine with the history of organophosphorus poisoning

Study design: A prospective cross - sectional study.

Study duration: August 2018 – July 2019
Materials: Cases: 40 admitted to ASRAM hospital.
Controls: 10 healthy (age matched) individuals were kept as control.

Inclusion criteria:
- History of exposure to organophosphate poison.

Exclusion criteria:
1. Patients with indication of exposure to a entirely different poison other than OP poison.
2. Patients who have consumed poison along with alcohol and who are chronic alcoholics.
3. Patients with history suggestive of gall stone disease
4. Patients with known history of lipid disorders
5. History suggestive of parotid gland disease
6. Patients with history of renal or hepatic disease
7. History of intake of drugs likely to produce pancreatitis –

Azathioprin, Pentamidine, 6-Mercaptopurine, Thiazides.

Study protocol: A previously designed proforma was used to collect the demographic and clinical details of the patients.

Collaborating department: Department of Biochemistry, ASRAM, ELURU.

The following parameters were analysed for association with OP pesticide exposure: Demography, Age, Sex ,Time of Admission, Economical Status, Familial Status, Reason for consumption ,Poison Particulars, Severity grade.

Symptoms after consumption,Immediate steps taken after OP exposure.

Tests done are:
Serum Amylase, Blood glucose, urea, creatinine and Liver function tests. Clinical Outcome, Clinical Presentations. Pupil size, Pulse rate/min, Blood pressure, Respiratory rate/min, Secretions.

OBSERVATIONS & RESULTS:
Data analysis was done with using Epidemiological Information Package . Using this software, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's test for qualitative variables. A 'p' value less than 0.05 is significant

The majority of poisonings followed oral ingestion of liquid form.

The incidence was higher (40%) in the age group of 21-30 followed by (35%)in the age group of 31-40.

The most common reason for consumption was found to be the familial stress (65%) followed by financial stress (25%).

Methyl parathion accounted for about 52.5% of intoxication .

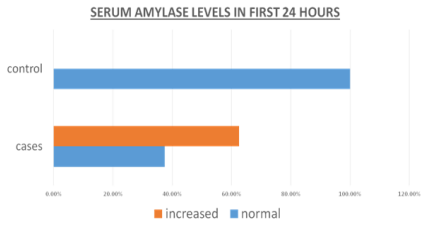
The commonest mode of intake was found to be poison along with water (67.5%).

The most marked muscarinic signs in the present study were, miosis (55%), excessive secretions (60%), and respiratory distress (25%).The most prominent nicotinic effect is muscle weakness and fasciculations (30%).

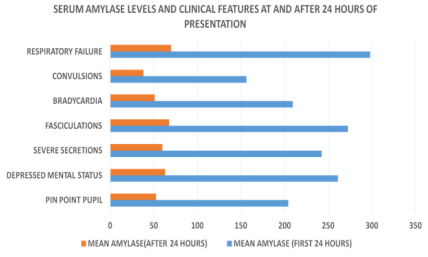
The biochemical parameters blood sugar, serum creatinine & urea have not shown much variation from the normal levels in this study.

The most troublesome complication was respiratory depression.

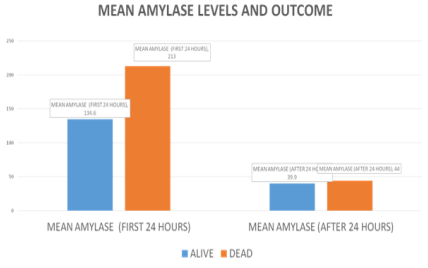
RELATIONSHIP BETWEEN INCREASED AMYLASE LEVELS AND OTHER FACT



P VALUE – 0.0015
SERUM AMYLASE LEVELS AND CLINICAL FEATURES AT AND AFTER 24 HOURS OF PRESENTATION:



MEAN AMYLASE LEVELS AND OUTCOME:



DISCUSSION:
In the present study, the amylase levels were significantly elevated at the time of admission [185.2 U/L] and have shown a gradual remission with proper treatment. The mean amylase level in severely poisoned patients was 297.7 U/L which was significantly ($P < 0.01$) higher than the healthy control group. On comparing the amylase levels in first 24 hours [mean (first 24 hours) - 154 U/L] against control, the variations were considered to be significant ($P < 0.01$). In the present study, there was no significant correlation between elevated amylase levels and the outcome. Age and sex of the patients have no significant relationship with the amylase levels. CONCLUSION: In India, organophosphorus compounds cause more suicidal deaths among the earning and none arning members of the society.

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) Severe secretions (242 U/L)
iii) CNS depression (261 U/L)
iv)Fasciculations(272U/L)
v) Respiratory failure (297.7U/L)

Hence Serum amylase levels may be considered as a marker of organophosphorus intoxication as it enables the early recognition of severity and also helps to identify those at risk of developing the complications of organophosphorus poisoning .

CONCLUSIONS:
- The study 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 leads to various complications that include convulsions, CNS depression, fasciculations and respiratory failure.
- Hence Serum amylase levels may be considered as a marker of organophosphorous intoxication as it enables the early recognition

of severity and also helps to identify those at risk of developing the complications.

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