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Original research Paper

Outcome of organophosphorus poisoning cases at a tertiary care hospital

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Abstract

The treatment of a patient of suspected OPC Poisoning is initiated even before his/her admission to casualty in terms of decontamination by washing the contact body surface, removal of clothes and at arrival to casualty with suspicion of OP poisoning, history, examination, and specific treatment with investigations are carried out concurrently to reduce morbidity and mortality associated with OP poisoning. Ethical clearance was taken from the institutional ethical committee. Written informed consent was taken from all subjects and their attenders. In our study, total 7% patients went for intermediate syndrome, in that 5% patients were in mild group, 2% patients in moderate group. Compounds which led to IMS are Malathion-3%, Dimethoate2%, Parathion-2%, Dichlorovas-1%.

Keywords: Organophosphorus poisoning, carbamates, dichlorvos

Introduction

The onset and severity of OP poisoning is determined by the degree, route of exposure, the lipid solubility and rate of metabolism of the particular compound and activation in liver, required before the compound is active [1].

OP compounds and carbamates are generally highly lipid soluble and hence may be systemically absorbed and can cause toxic effects within minutes after exposure. They are well absorbed by inhalation, ocular exposure, across any mucosal surface, the skin and throughout the gastrointestinal tract (GIT).Skin exposure is extremely important, as many cases of toxicity occur after cutaneous exposure alone. Exposure by inhalation results in the fastest appearance of toxic symptoms, followed by the gastrointestinal route and finally the dermal route [2, 3].

Direct acting OP agents function to inhibit cholinesterase directly, and do not require bio-activation in the liver. The insecticide Dichlorvos is an example of a direct inhibitor. Indirect inhibitors require oxidation by the gastrointestinal mucosa and liver to active forms, which then inhibit ChE. Most of the commonly encountered insecticides such as Malathion and Parathion are indirect agents and require bio-activation before manifesting toxicity. Most of the indirect inhibitors undergo desulfuration in the intestinal mucosa and liver following absorption to form the more active phosphate metabolites [4].

The practical importance of this classification is that direct inhibitors cause symptoms and signs quickly during or after exposure, whereas in the case of indirect inhibitors symptoms and signs appear later and the effects last longer after cessation of exposure.

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Because OP agents are more fat soluble, they may accumulate in the body's fat stores which act as a "reservoir", prolonging elimination and toxic effects. This has been reported for more lipophilic compounds such as Fenthion and Chlorfenthion [5].
The treatment of a patient of suspected OPC Poisoning is initiated even before his/her admission to casualty in terms of decontamination by washing the contact body surface, removal of clothes and at arrival to casualty with suspicion of OP poisoning, history, examination, and specific treatment with investigations are carried out concurrently to reduce morbidity and mortality associated with OP poisoning [6].

Methodology
Sample Size: 100.

Estimated based on the formula 4pq/d2 where p is the prevalence of Community acquired pneumonia in KR hospital for one year and q =1p 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 producepancreatitis. I.e. Azathioprine, mercaptopurine, thiazides, frusemide, pentamidine.

Type of study

- Hospital based cross section observational study:
- The study required blood samples to be collected from the subjects for routine investigations.
- Complete hemogram.
- Liver function tests.
- Renal function tests.
- Electrocardiogram.
- Serum electrolytes.
- Random blood sugar.
- Serum AMYLASE-on day 1, day 3, day 5.
- Serum pseudocholinesterase.

Ethical clearance was taken from the institutional ethical committee. Written informed consent was taken from all subjects and their attenders.

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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

Table 1: POP Scoring Severity

Severity	POP scores	Number(percentage)
Mild	0-3	79
Moderate	4-7	18
Severe	8-11	03

According to POP scoring system, 79% were in Mild category, 18% were in Moderate and 3% in severe category. Mean POP score is 1.39±

Table 2: POP scoring and Ventilator requirement

Severity	POP Scores	Ventilator support on Day 1	Ventilator
Mild	0-3	0	4
Moderate	4-7	13	2
Severe	8-11	03	0

In our study, initially 16 patients were put on ventilator and 6 patients were put later after assessing clinical conditions.

Table 3: Table showing number of ampoules of atropine required for the subjects

Number of ampoules	Number of subjects
<20	18
20-29	44
30-39	21
40-49	9
50-59	2
>60	6

Mean atropine ampules used is 30.9

Table 4: Duration of hospital stay

Severity	Average duration of stay in days
Mild	4.83 ± 2.1
Moderate	9.05 ± 3.8
Severe	18.66 ± 6.7

Number of deaths

- Out of 100 patients, there were total of 5 deaths.
- Mean Pseudocholinestrase is 508± 124.11.
- Mean AMYLASE on Day 1 is 447.66 ± 88.71.
- Day 3 is 806.22 ± 396.
- Day 5 is 1035.3 ± 582.9.

All of them were on ventilator support.
In 5 deaths, 2 deaths occurred in chlorpyriphos poisoning

- 1 death occurred in Dimethoate poisoning.
- 1 death in Malathion poisoning.
- 1 death in Parathion.

Discussion

Table 5: Comparison of deaths and need of ventilator support

Severity according to POP score	Present study		KOIRAL *et al.* [7]	
	Death %	Ventilator support	Death %	Ventilator support
Mild	0	0%	0	1.56%
Moderate	2%	15%	3.12%	9.37%
Severe	2%	03%	4.7%	6.25%

- In our study, total 7% patients went for intermediate syndrome, in that 5% patients were in mild group, 2% patients in moderate group.
- Compounds which led to IMS are Malathion-3%, Dimethoate2%,Parathion-2%, Dichlorovas-1%
- In a study conducted by Dr. Vikram Palimar *et al*., 153 cases of OP poisoning cases presented to Kasturba Hospital, Manipal during a 2 year period, out of which 45 cases (29.4%) had features of Intermediate Syndrome. Methyl Parathion was the commonest compound (57.7%)
- Some study findings as follows [8, 9, 10].
- Elango *et al.* 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, fasciculation's and respiratory failure.
- In a study done by Salame *et al.*, concluded that the serum amylase levels considered as a marker of organophosphorus intoxication, since it enables the early recognition of severity and also helps to identify those at risk of developing the complications of Organophosphorus poisoning.
- Koiral, *et al.* has shown revealed that there was increase in serum amylase level in all patients with OP poisoning.
- Lee WC, *et al*. study showed finding of hyperamylasemia was closely related to clinical severity and presence of shock.
- In a study conducted in Japan by Sumiya *et al.*, an increase in plasma amylase levels above the normal range have been found in 50% of the patients who developed respiratory failure.

Conclusion

Average duration of hospital stay increases as the severity of poisoning is increased.

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