



A STUDY OF OUTCOME & ECG CHANGES IN PATIENTS OF ORGANOPHOSPHORUS POISONING

General Medicine

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ABSTRACT

Background- Very few studies are published on subject of organophosphorus poisoning from Rajasthan India. So, this study has been aimed to determine the Electrocardiographical changes with outcome in organophosphorus poisoning.

Methods- This study was a prospective observational study in patients admitted in medicine (ward / medical ICU) in SRG hospital, Jhalawar. All the patients who presented with organophosphorus poisoning and met our inclusion criteria during the study period were taken up for study.

Results- Out of 11 died patients, 4 patients presented with ST elevation, 4 with VT, 2 with QTc prolongation and 1 with AF.

Conclusion- We conclude that OPC-Poisoning is a major cause of morbidity and mortality and is suicidal in most of the cases. ECG abnormalities are more in POP severe grade of poisoning.

KEYWORDS

OP poisoning, ECG, POP

INTRODUCTION

Organophosphorus compounds (OPC) are most commonly used as pesticides and insecticides. Some of them also have medicinal properties. (e.g., Malathion in shampoo). In developing countries, Organophosphorus compounds and other pesticides represent the most common causes of death from intoxication.¹

India has the highest incidence of OP poisoning in the world. Nearly 90% of the poisoning are suicidal with a fatality rate of >10%; 8-10% accidental and <1% Homicidal. Occupational exposure accounts for 1/5 th of accidental poisoning with fatalities of <1%.²

Cardiac manifestations often accompany poisoning with these compounds including Hypotension, Hypertension, Sinus bradycardia, Sinus tachycardia, Arrhythmia & Cardiac arrest.

Electrocardiographic changes reported in previous studies include Sinus tachycardia, Sinus bradycardia, QTc prolongation, ST-T changes, along with various forms of Arrhythmias, which may be serious and fatal. These complications are potentially preventable, if recognized early and treated adequately.³

Very few studies are published on subject of organophosphorus poisoning from Rajasthan India. So, this study has been aimed to determine the Electrocardiographical changes with outcome in organophosphorus poisoning.

MATERIALS AND METHODS

This study was a prospective observational study in patients admitted in medicine (ward / medical ICU) in SRG hospital, Jhalawar.

Sample Size:

All the patients who presented with organophosphorus poisoning and met our inclusion criteria during the study period were taken up for study.

Sampling Technique:

Complete enumeration (census) during the study period.

Inclusion Criteria:

All patients above 18 years of age with history of ingestion and/or exposure of organophosphorus compounds of either sex, admitted to our hospital within 24 hours of ingestion and not having been treated outside, with characteristic clinical manifestations of organophosphorus compound poisoning including salivation, lacrimation, urination, diarrhoea, GI upset, emesis, diaphoresis, miosis, bradycardia, tachycardia etc. during the study period were included.

Exclusion Criteria

1. Patients who have ingested other substance in addition to OP were excluded.
2. Patients who were known to have pre-existing heart disease like Rheumatic heart disease, Ischemic heart disease, congenital heart disease, cardiomyopathies.
3. Patients who were known case of respiratory illness like COPD, interstitial lung disease, asthma, bronchiectasis.
4. Patients with chronic kidney disease.
5. Patients who were below the age of 18 years.
6. Non-cooperative patient who refused to participate in the study.
7. History of atropine administration before time of presentation to emergency department.
8. Duration of exposure of poison more than 24 hours.

METHOD OF COLLECTION OF DATA:

Data was collected using a pretested proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations were undertaken. All the routine and specific investigation including ECG, CXR PA view were performed.

The purpose of the study was explained to the patient and informed consent was taken from every patient or from attendants of patients after full explanation of procedure regarding the study and all such manoeuvres were performed under medical ethics and through the cooperation of whole team.

The diagnosis was based on the definitive history of OP poisoning and evaluation of clinical features. All such patients were further evaluated. An ECG was recorded in each case as soon as possible (usually within 15 minutes) after admission. Treatment was not withheld in any case for the purpose of study. Serial ECGs were obtained at 12 hour intervals (or earlier if any arrhythmia was detected clinically) during the period of stay in the hospital, analysis included the rate, rhythm, ST-T abnormalities, conduction defects and measurement QT intervals. The period of occurrence of such ECG changes were noted and the time of their normalization or death of patient whichever earlier were noted. The final outcome was registered as death or survival.

Statistical Analysis

All the data was collected through standardised Proforma and entered in MS Excel and analysed through SPSS-23.0 software. All the applicable statistical tests were used for data analysis.

RESULTS

Table 1. Demographic Wise Distribution Of Study Subjects

Age in Yrs	26.32±6.69
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Male : Female	131 : 69
Rural : Urban	182 : 18
Succidal : Accidental	170 : 30
Contamination : Ingestion : Inhalation	2 : 182 : 16

Table 2. Association Between Duration Since Exposure And Outcome

Time	Outcome		Total
	Death	Survived	
<6 hr	0	139	139
6-12 hr	4	35	39
>12 hr	7	15	22
Total	11	189	200

p-value=0.02

Table no. 2 shows that 11 cases out of 200 died, Outcome was better in those cases who were admitted with in 6hrs. of exposure (0 deaths) compared to those presenting between 6 to 12 hrs. (4 deaths) and those who presented after 12 hrs. (7 deaths) association between duration since exposure and outcome was found statistically significant (p-value=0.02).

Table 3. Association Between ECG Finding And Outcome

ECG finding	Outcome		Total (n=97)
	Death	Survived	
Sinus tachycardia	0	25	25
Sinus bradycardia	0	15	15
QTc prolongation	2	19	21
ST elevation	4	11	15
AF	1	3	4
VT	4	2	6
Extra systole	0	6	6
Prolonged PR interval	0	5	5

Out of 11 died patients, 4 patients presented with ST elevation, 4 with VT, 2 with QTc prolongation and 1 with AF.

Table 4. Association Between ECG Finding And POP Score

ECG finding	POP score			Total
	Mild	Moderate	Severe	
Sinus tachycardia	16	8	1	25
Sinus bradycardia	11	3	1	15
QTc prolongation	7	10	4	21
ST elevation	4	7	4	15
AF	1	1	2	4
VT	0	2	4	6
Extra systole	2	2	2	6
Prolonged PR interval	1	2	2	5

Table no. 4 shows that the common presentation was sinus tachycardia (25, out of which 16 were associated with mild POP score grading, 8 with moderate and 1 with severe), Closely followed by QTc prolongation (21 cases, out of which 7 were associated with mild POP score grading, 10 with moderate and 4 with severe), 15 cases each presented with sinus bradycardia (11 mild, 3 moderate and 1 severe) and ST elevation (4 mild, 7 moderate and 4 severe), 6 each presented with VT (0 mild, 2 moderate and 4 severe) and extra systole (2 mild, 2 moderate and 2 severe), 5 with prolonged PR interval (1 mild, 2 moderate and 2 severe) and 4 with AF (1 mild, 1.03% moderate and 2 severe).

DISCUSSION

OPC compounds have largely been used in agriculture in many parts of the world. The use of organophosphates to commit suicide is a major problem, particularly in developing countries. The lack of adequate regulations on the sale and easy accessibility resulted in a gradual increase in accidental and suicidal poisoning.

In our study out of 200 cases 97 (48.5%) had cardiac manifestations among which the commonest presentation was sinus tachycardia (25.77%, out of which 16.94% were associated with mild POP score grading, 8.24% with moderate and 1% with severe). Closely followed by QTc prolongation (21.64%, out of which 7.16% were associated with mild POP score grading, 10.30% with moderate and 4.12% with severe). 15.00% each presented with sinus bradycardia (11.34% mild, 3.09% moderate and 1.03% severe) and ST elevation (4.12% mild, 7.21% moderate and 4.12% severe), 6.85% each

presented with VT (0% mild, 2.06% moderate and 4.12% severe) and extra systole (2.06% mild, 2.06% moderate and 2.06% severe), 5.15% with prolonged PR interval (1.03% mild, 2.06% moderate and 2.06% severe) and 4.12% with AF (1.03% mild, 1.03% moderate and 2.06% severe).

Kiss Z et al¹ in their study found sinus tachycardia as the most common ECG finding (30%) followed by QTc prolongation (24.4%), similar to what found in our study.

Tripathy SK et al⁵ in their study found a very high incidence of ECG changes in OP poisoning and the most significant ECG finding was QTc prolongation and was associated with severe exposure and increased mortality. VT was found more commonly in severe poisoning whereas sinus tachycardia and sinus bradycardia were more common in mild grade of poisoning. In their study 60 (60%) of patients developed cardiac manifestations.

The ECG findings detected in our series were prolonged QTc, bradycardia, tachycardia, T wave inversion, AF, prolonged P-R interval, ST-elevation, PVCs, ventricular tachycardia and combined arrhythmias. These ECG findings are in concordance with Karki et al study where similar arrhythmias in different proportions were observed.⁶

In our study total 11 cases (5.5%) died out of which 4 cases (2%) each died due ST elevation M.I. and VT, 2 (1%) died due QTc prolongation and 1 case (0.5%) died due to AF. Similar to what found by Dalvi CP et al⁷ where total of 7% cases died out of which 3% cases died due ST elevation M.I., 2% due to VT and 2% died due QTc prolongation.

In a series of 168 cases of OPC-Poisoning reported by Kiss and Fazekas, five (3.00%) had transient picture of myocardial infarction.

Overall, the frequency of QTc prolongation in several series of severe OPC-Poisoning was shown to be 20 to 80% depending on the severity of the poisoning and the type of the toxic agent. This complication usually starts during the second to third day and may last up to two weeks post-intoxication.

In our study out of 200 cases 97 (48.5%) had cardiac manifestations among which the commonest presentation was sinus tachycardia (25.77%, out of which 16.94% were associated with mild POP score grading, 8.24% with moderate and 1% with severe). Closely followed by QTc prolongation (21.64%, out of which 7.16% were associated with mild POP score grading, 10.30% with moderate and 4.12% with severe). 15.00% each presented with sinus bradycardia (11.34% mild, 3.09% moderate and 1.03% severe) and ST elevation (4.12% mild, 7.21% moderate and 4.12% severe), 6.85% each presented with VT (0% mild, 2.06% moderate and 4.12% severe) and extra systole (2.06% mild, 2.06% moderate and 2.06% severe), 5.15% with prolonged PR interval (1.03% mild, 2.06% moderate and 2.06% severe) and 4.12% with AF (1.03% mild, 1.03% moderate and 2.06% severe).

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CONCLUSION

The ease of access to OPCs in developing countries like India has made it the main tool for suicidal poisoning. Present study was conducted keeping in mind the paucity of studies for cardiotoxicity in OP-Poisoning.

We conclude that OPC-Poisoning is a major cause of morbidity and mortality and is suicidal in most of the cases. ECG abnormalities are more in POP severe grade of poisoning.

Morbidity and mortality increase in patients with severe grade poisoning (according to POP score) and in those presenting after 6hrs.

of exposure ,as fatal form of cardiac manifestations like VT, ST elevation, QTc prolongation etc. are more common in severe grade of poisoning and in those with late presentation (>6 hrs.) to hospital.

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