

Clinical Manifestations and Outcome of Acute Organophosphorous Poisoning

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ABSTRACT

Aim: To know the frequency of various clinical manifestations of acute organophosphorous poisoning and outcomes in terms of mortality.

Study design: A prospective cross-sectional and observational study.

Place and duration of study: Medical Units of Multan medical and dental college, Akhtar Saeed medical and dental college, Services institute of medical sciences.

Methods & Results: All patients who presented to study institutions with history of organophosphorous poisoning were admitted and divided into grades according to the WHO recommendations. These patients were then subjected to standard treatment, which consisted of a) General methods of decontamination if these were not already performed. b) Methods to reduce absorption, which included gastric lavage. c) Complete biochemical profiles were sent to the laboratory immediately which consisted of Random Blood Sugar, Renal parameters, Serum electrolytes, Liver function tests, Electrocardiogram. Patients were observed for further period of 48 hours after which they were discharged if they had an uneventful recovery with the advice to report the ward immediately if they experienced reversal of symptoms and to report for follow up weekly.

Conclusion: Organophosphorous compound poisoning is a serious condition that needs rapid diagnosis and treatment.

Keywords: Acute, organophosphorous, poisoning

INTRODUCTION

Organophosphorous Compounds were first synthesized in the early 1800s when Lassaigne reacted alcohol with phosphoric acid. Shortly thereafter in 1854, Philip de Clermont described the synthesis of tetraethyl pyrophosphate at a meeting of the French Academy of Sciences. Eighty years later, Lange, in Berlin, and Schrader, a chemist at Bayer AG, Germany, investigated the use of organophosphates as insecticides^{1,2}. The use of chemicals can be traced back as far as 400 BC when, during the Peloponnesian war, burning sulfur was used to generate noxious sulfur dioxide fumes upwind from the besieged city of Plataea³. The first systematic large scale use of chemicals during wartime was seen during the First World War^{3,4}.

Organophosphorous compounds belong to a class of compounds called cholinesterase inhibitors^{1,2}. Following organophosphorous exposure the signs and symptoms can be grouped under the following main headings^{1,2, 5-8}: 1) Acute Cholinergic crises, 2) Delayed exposure syndromes. 3) Miscellaneous effects.

Acute organophosphate poisoning is a significant cause of morbidity and mortality in developing countries including Pakistan. Although no exact estimates are available, hospital based studies suggest that it is the commonest mode of poisoning. Most of these poisonings are usually due to suicidal intent although accidental events cannot be overlooked especially in children. According to WHO, one million serious accidental and two million suicidal poisonings due to insecticides occur worldwide, every year, of which 200,000 die and most of these deaths occur in developing countries. In a country like Pakistan, which is mainly, an agricultural country these poisons are freely available in shops and are widely used as insecticides in agriculture and in homes. The global conflicts, which are on a rise, also pose possible threats of chemical warfare, which are also organophosphate compounds.

METHODOLOGY

All patients who presented to study institutions Multan Medical and Dental College Multan, Akhtar Saeed Medical and Dental College Lahore, Services Institute of Medical Sciences Lahore, with history of organophosphorous poisoning were admitted and divided into grades according to the WHO recommendations. WHO classification of severity of organophosphorous poisoning. GRADE I (MILD),

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GRADE II(MODERATE) and Grade III (SEVERE) These patients were than subjected to standard treatment, which consisted of a) General methods of decontamination if these were not already preformed. b) Methods to reduce absorption, which included gastric lavage.c) Complete biochemical profiles were sent to the laboratory immediately which consisted of Random Blood Sugar, Renal parameters, Serum electrolytes, Liver function tests, Electrocardiogram. However acetylcholinestrase documentation was not done for the reasons already mentioned.Treatment consisted of administration of atropine in a dose of 0.02-0.08mg/kg as a bolus and then as a continuous intravenous infusion. Therapeutic target of atropinization was taken as Pupil size >5mm, heart rate >110.

Patients were observed for a period of 48 hours during which outcome variables noted, after which they were discharged if they had an uneventful recovery with the advice to report to the ward immediately if they experienced reversal of symptoms and to report for follow up weekly.

RESULTS

One hundred patients with the diagnosis of organophosphorous poisoning were studied in the medical departments of study institutions.The patients were studied and there variables noted. Following were the salient features of these patients. Gender As detailed in figure 1, 64 were males and 36 females

Patients of all age groups who suffered from organophosphorous poisoning were studied and amongst these majority were young patients with the age range from 16-40 (83%) and the highest incidence was in age group 21-30 as shown figure 2. Age less than 10 are represented very few as patients from the peadiatric group were not included in the study.

Ingestion was the major route of exposure in the study the total number of patients presenting with ingestion were 75 as compared to inhalation 20 and contact 5. Figure 3.Out of the hundred cases studied 69 had suicidal ingestion of poison, 26 of these had accidental exposure and 5 cases reported to be homicidal amongst which one was male and four females (Fig 4).

According to the WHO grading of severity 10 patients were mildly poisoned of which 8 were males and 2 females. 54 patients presented to us with moderate poisoning of whom 36 were males and 18 females. 36 patients presented to us with severe poisoning of whom 18 were males and 16 females (Fig. 5,6). Similarly it can be seen that most of the patients with

moderate to severe poisoning are from the age group 16-40 as shown in figure 7.

Table 1 showing that only 21 patients presented with muscle weakness.53 Patients presented with complaint of fatigue. Salivation was present in 92 patients. Lacrimation was present in 80 patients .Urination was seen in 66 patients. Sweating was seen in 62 patients. Bronchospasm was present in 68 patients and 32 patients did not exhibit any signs of bronchospasm.8 patients had fasciculations. Fits were observed in 26 patients and the remaining had no signs. Cranial nerve paralysis was observed in 15 patients and the most common presentation observed was involvement of the IIIrd cranialnerve.The Q-Tc interval was found to be prolonged in 23 patients who were included in the study and the Q-Tc was observed to return to normal values in 10 patients by the third day of admission and therapy. The remaining 77 patients had normal Q-Tc interval on ECG at presentation, and no change was observed during subsequent evaluation.16 patients required assisted ventilation due to severe respiratory compromise and only five of these survived. Figure 8.67 patients presented to us with bradycardia heart rate less than 60. Seventeen patients presented with heart rate 60-70 and 16 patients with heart rate of more than 70 beats per minute.Cutaneous manifestations were absent in 89 patients. 8 patients presented with mild erythema and burning sensations. Figure 9. 3 patients presented with severe erythema and one of the patients had superficial ulcerations of the skin this was probably because of the anatomical location of the groin where he had accidental spillage of the insecticide during transportation and was probably unable to carry out immediate measures.

Fig. 1



Of the one hundred patients admitted and studied 82 were discharged from the hospital after an average of 4 days though some patients were discharged as early as two days and a few remained admitted for 10-12 days. 18 patients died in the hospital and most of the deaths occurred during the initial 12 hours.

Figure 10. Among the expires there were 8 males and 10 females. Figure 11. It can also be seen from figure 12 that 17 patients who expired were from class III according to WHO classification and 1 from class II.

Fig. 2.

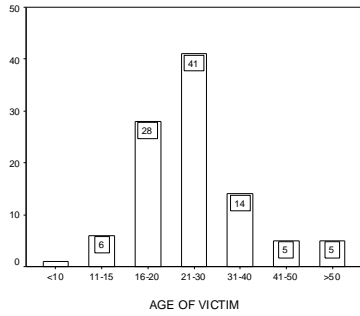


Fig. 3.

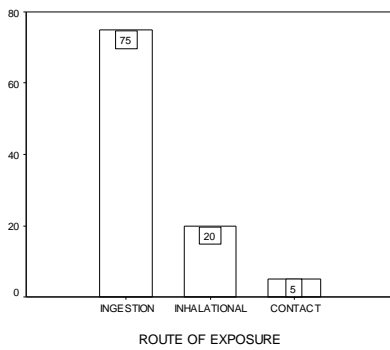


Fig. 4.

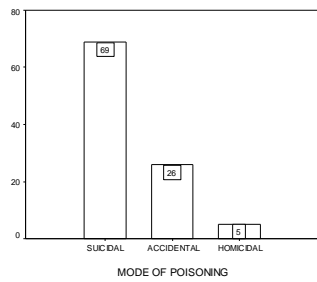


Fig. 5.

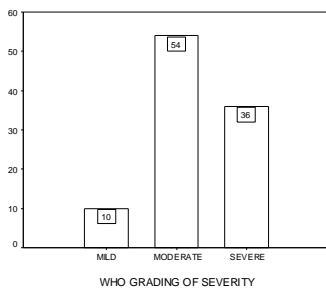


Fig. 6.

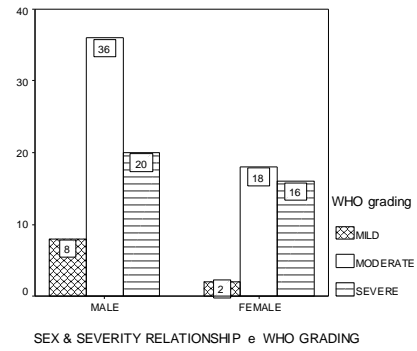


Fig. 7.

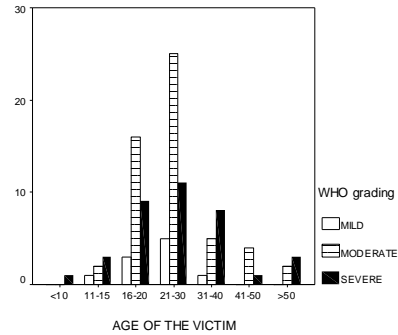


Table 1:

Variables	Yes	No
Muscle Weakness	21	79
Fatigue	53	47
Salivation	92	08
Lacrimation	80	20
Urination	66	34
Sweating	62	38
Bronchospasm	68	32
Twitching	40	60
Fasciculation	8	92
Fits	26	74
Cranial Nerve Paralysis	15	85
QTc interval Prolongation	23	77
Assisted Ventilation	16	84

Fig. 8.

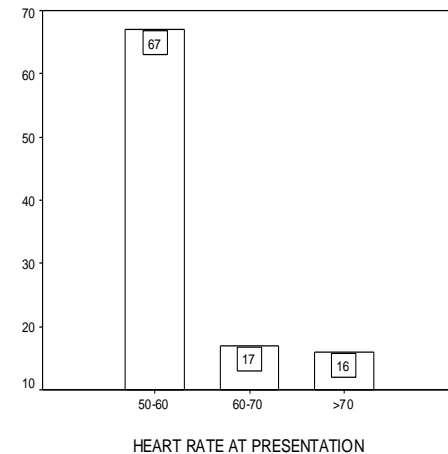


Fig. 9

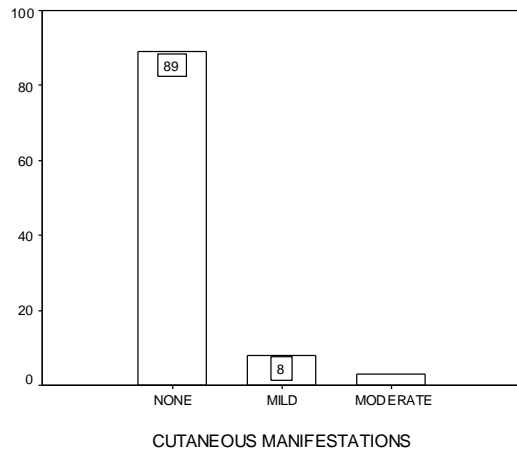


Fig. 12.

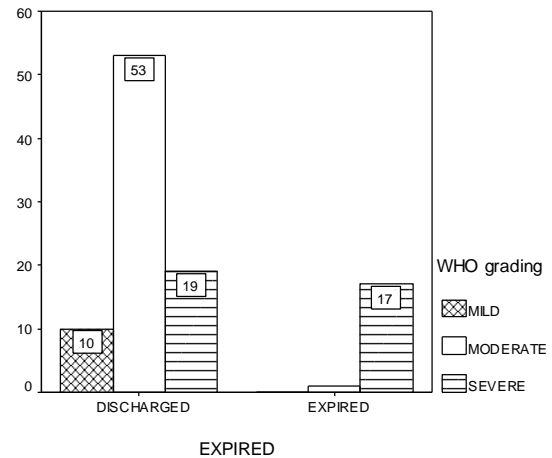
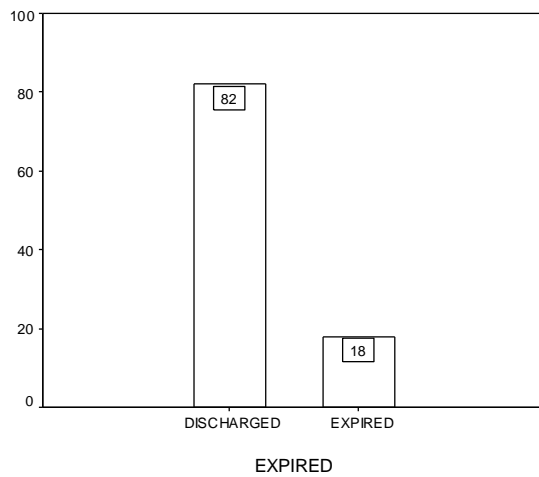


Fig. 10.



DISCUSSION

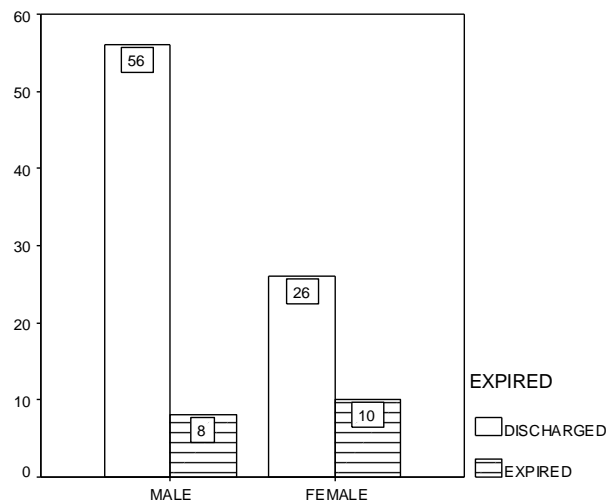
A prospective cross-sectional and observational study comprising a total of 100 consecutive hospitalized patients with diagnosis of organophosphorous poisoning were studied. All patients of organophosphorous poisoning irrespective of sex and mode of presentation were included; children below the age of 10 years usually are dealt with by the paediatric department. Patients who presented with Nicotine poisoning, opioid poisoning, Mushroom poisoning or had other diseases like Myasthenia gravis, Eaton Lambert syndrome, Guillain-Barrie syndrome, Pontine hemorrhage and Cardiac disturbances were not studied.

Frequency of various clinical manifestations of organophosphorous poisoning and to know the outcomes in terms of mortality by dividing the patients according to WHO criteria.

The data derived from the study clearly shows that of the hundred patients studied 64 were males and the remaining 36 were females. This male predominance is also supported by another study carried out in Multan in which 73% were males and 27% females⁹. This study is in contrast to an other study done in Iran which showed that although the age groups were similar in both studies more females attempted suicide as compared to males 51.4% Vs 48.6%.

The study showed that suicidal was the most common mode of poisoning followed by accidental and homicidal modes, which were 69%, 26% and 5% respectively. Where as the previous study⁹ showed that suicidal, occupational and accidental incidences were 53%, 23% and 24% respectively. An other study of organophosphorous poisoning done in Turkey revealed 68% were suicide attempts and 32% were accidental exposure. An other study done in

Fig. 11.



Iran¹⁰ showed a suicidal attempt in 78.3%, a study in Lublin¹¹ showed a suicidal attempt in 63%, and a study in Poland¹² showed a suicidal attempt in 50% of the cases. Majority of the cases were young people from the age group 16-40 about 83 % this closely matches the other study in which about 81% of the victims were in the age range of 14-30 years. Of the eighteen patients who expired 17 presented to us with severe poisoning graded as class III poisoning according to WHO criteria.

The most frequent signs noted in the study were miosis 94%, salivation 92% lacrimation 80% bronchospasm 68% urination 66% sweating 62% and twitching was seen in 40% of the cases. The incidence of cranial nerve palsies and muscle weakness was 15% and 21% respectively. This is slightly higher than the other study done in turkey but close to another study done by Shaliesh 15.8%. A similar study showed that intermediate syndrome in found in 76% of victims of organophosphorous poisoning.

Majority of the patients 67% presented to us with a heart rate of between 50-60 beats/min, and the remainder above 60/min. twenty three patients presented with prolongation of the Q-Tc interval an observation done by the naval hospital stated that the prolongation of Q-Tc interval is seen in almost 67% of the cases of organophosphorous poisoning. Sixteen patients (16%) required mechanical ventilation. This also closely resembles other studies done¹³.

Of the hundred patients studied 18 patients expired which included 10 females and 8 males. Of these 18 patients 17 belonged to class III of WHO grading and the remaining class II of WHO grading.

CONCLUSIONS

1. Organophosphorous compound poisoning is a serious condition that needs rapid diagnosis and treatment.
2. Since respiratory failure and cardiac arrhythmias are the major reason for mortality, careful monitoring, appropriate management and early recognition of this complication may decrease the mortality rate among these patients.

3. The importance of first aid cannot be over looked because patients who receive first aid at the spot do better than those without and have less complications and severity of poisoning.
4. Prolongation of the Q-Tc interval, presence of cardiac arrhythmias and respiratory depression are markers of poor prognosis.

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