ABSTRACT

Objective: To describe the acute and late complications of organophosphate (OP) poisoning.
Study Design: Case series.
Place and Duration of Study: Medicine Department at Peoples Medical College Hospital, Nawabshah, from June 2008 to December 2009.
Methodology: A total of 300 patients with organophosphate poisoning admitted to the Medical ICU were included. Baseline investigations included blood complete picture, urea, creatinine, arterial blood gas values, and serum cholinesterase levels. Data was retrieved from the files on a structured proforma. Studied variables included gender, mode of exposure, acute (occurring within 4 weeks) and delayed (occurring after 4 weeks onwards) complications

Results: There were 50 (16.66%) males and 250 (83.33%) females with ratio of 1:5. Two hundred and forty eight (82.6%) had ingested while 18 (6%) had inhaled the poison. Acute complications included fits in 50 (16.66) bradycardia in 30 (10%) and hyperglycemia in 15 (5%) patients. Delayed complications (after 4 weeks and later) included monoplegia and mild sensory loss of lower limbs in 4 (2.66) and paraplegia and weakness of upper limbs in 2 (0.66%) patients each. A total of 50 patients died due to different complications in acute period making a mortality rate of 16.66%.

Conclusion: Frequency of acute organophosphate (OP) poisoning complications is much higher and related with high mortality and morbidity and where as late complications are less frequent and less life threatening.

Key words: Organophosphate (OP) poisoning. Acute complications. Late complications. Seizures. Bradycardia. Monoplegia.

INTRODUCTION

Organophosphate (OP) is the general term for esters of phosphoric acid.1,2 In 1932, German chemist Willy Lange and his graduate student, Gerde von Krueger, first described the cholinergic nervous system effects of organophosphates, noting a choking sensation and a diminution of vision after exposure.3 This discovery later inspired the German chemist Gerhard Schrader in 1930s to experiment with these compounds as insecticides.4 OP is the commonest suicidal agent in Pakistan. The American Association of Poison Control Centre reported 102,705 cases of the incidence of organophosphate annually;6 the highest incidence is seen in India.5,6 The incidence in Sri Lanka is 10,000 – 20,000 hospital admissions annually.7 According to WHO estimation around 10,000 hospital deaths annually occur from OP poisoning world-wide.8 Signs and symptoms are divided into muscarinic effects, nicotinic effects and central nervous system effects.9 Morbidity and mortality are due to insufficient respiratory management, delayed intubation, cardiac complications, aspiration pneumonia, weakness and neuropathy.10

Despite its common occurrence, there is not much awareness. The current study was aimed to determine acute and late complications of organophosphate poisoning.

METHODOLOGY

This case series was conducted at the ICU of Medicine Department at Peoples Medical College Hospital, Nawabshah, from June 2008 to December 2009. All patients of OP poisoning were included in this study. Detailed history was taken from all the patients’ relatives about the circumstances of poisoning. Detailed clinical examination of the patients was done. Diagnosis of OP poisoning was based on clinical features that included bronchorrhoea, bronchospasm, miosis, salivation, defecation, urination and hypotension, history of exposure to a known OP compound and low serum pseudocholiesterase activity (level < 4500 IU). Patients were treated according to the standard protocol of organophosphates poisoning with respiratory support, atropine and prollidoxime. All patients were dealt upto recovery or death from poisoning and follow-up of all recovered patients was done to assess any delayed complication. The acute complications were defined as those which occur after 4 weeks of onset of poisoning and late complications were those which occur after 4 weeks and later.

Studied variables included gender, mode of exposure, acute (occurring within 4 weeks) and delayed (occurring after 4 weeks onwards) complications.
Results were compiled for descriptive statistics through SPSS software version 16.

RESULTS

Three hundred cases of OP poisoning were admitted during the study period. Two hundred and forty eight (82.66%) patients ingested the compound, 23 (7.6%) patients had dermal exposure, 18 (6%) patients had inhaled while 11 (3.6%) patients had other types of exposure. Fifty (16.66%) were male and 250 (83.33%) female with ratio of 1:5. There was wide variation of age ranging from a minimum of 14-50 years with mean age of 32 ± 5.2 years.

The most common complications were respiratory distress and mental confusion in almost all cases. One hundred and fifty patients out of 300 were stable after gastric lavage. They were kept under observation for the next 3 days and finally discharged. The remaining 150 patients were in coma and developed acute complications. Fifty (16.66%) patients developed episodic convulsions. Twenty (6.66%) patients developed profuse diarrhea. Severe bradycardia was seen in 30 (10%) patients. Hypotension was seen in 30 (10%) patients, 15 (5%) patients developed hyperglycemia and 5 (1.66%) patients developed acute renal failure with anuria. Fifty (16.66%) patients died in different complications of organophosphate poisoning (Table I).

Delayed complications i.e. those which occurred after 4 weeks and later were seen in 8 (2.66%) patients who were received unconscious. Four (1.33%) patients developed monoplegia with mild sensory loss of lower limb and 2 (0.66%) patients each developed paraplegia and weakness of both upper limbs (Table I).

DISCUSSION

Organophosphate (OP) compounds are widely used as pesticides in agricultural parts of the world. Insufficient control on the importation, production, storage and unsafe use of OP pesticides are the common reasons of poisoning.\(^\text{11}\)

Suicidal and non-suicidal organophosphate poisoning is a major problem in rural areas of Pakistan and the incidence are increasing rapidly due to increasing sentimental situations.\(^\text{5}\)

The male to female ratio in this study was 1:5. However, the male to female ratio given by Ather,\(^\text{12}\) is 1:1 and Tall et al.,\(^\text{10}\) is 1:1.8 which is quite different from present study. The age ranged from 14 to 50 years with mean age was 32 ± 5.2 years. The prime age for presentation in this study was between 25-40 years which is comparable to other study where age ranged between 14-60 years.\(^\text{11}\) However, Hayden et al. showed age range from 13 to 47 years with a mean age of 23 years.\(^\text{13}\)

In this study, majority of complications were found to be more frequent in acute stage i.e. within 4 weeks of poisoning as compared to late complications i.e. after 4 weeks and onwards. In this study, respiratory distress and mental confusion were observed in almost all cases and similar reported by Tall et al.\(^\text{10}\)

In the present study there were 16.66% cases of deep coma which developed 4-7 days after hospital admission with pulmonary complication. A study conducted by Sequeira showed the frequency of deep coma to be 21%.\(^\text{14}\)

Acute complications seen in this study were episodic convulsions developed in 50 (16.66%) patients, 20 (6.66%) patients developed profuse diarrhea, severe bradycardia was seen in 30 (10%) patients, hypotension was seen in 30 (10%) patients, 15 (5%) patients developed hyperglycemia and 5 (1.66%) patients developed acute renal failure. Acute complications as given by Malik were bradycardia in 29 (93.5%), change in mental status in 10 (32.2%), low oxygen saturations (less than 90%) in 21 (67.8%) and subsequent convulsions in 3 (9.6%).\(^\text{17}\)

Delayed complications were seen in those patients who were received late and unconscious. All were neurological and predominantly motor deficits. Jamal et al. found neuropathy and sensory motor distal axonopathy especially distal paresis in lower limb in 1.5% patients ingesting large doses of organophosphates.\(^\text{15}\)

In the present study, it was observed that the 16.66%
mortality, in different acute complications of organophosphate poisoning was due to central respiratory depression, bronchospasm, excessive bronchosecretion, severe bradycardia, and hypotension. Later it was a result of acute renal failure and complications of aspiration and long-term ventilation. However, frequency of mortality due to OP given by Yamashita varied between 4% and 30%,\textsuperscript{16} 5.5% in a study by Malik\textsuperscript{17} and 8% in the study by Aziza \textit{et al.}\textsuperscript{18}

**CONCLUSION**

Frequency of acute organophosphate (OP) poisoning complications is much greater and related with high mortality and morbidity and where as late complications are rare and less life threatening. These patients are to be shifted to a well-equipped ICU as soon as possible. Good supportive care and observation can help reduce the acute complications like episodic convulsions, severe bradycardia and renal failure and also the delayed complications like monoplegia and paraplegia.

**REFERENCES**