



Organophosphorus Poisoning Cases Requiring Mechanical Ventilation: A Retrospective Study at a Tertiary Hospital

KEYWORDS

organophosphorus ,mechanical ventilation

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ABSTRACT *OBJECTIVE: To document the pattern and outcome of organophosphorus (OP) poisoning cases requiring mechanical ventilation in an intensive care unit(ICU) of a Tertiary hospital.DESIGN: Descriptive, retrospective study.METHODS: Medical records of patients of OP poisoning admitted to our intensive care unit(ICU) from January 2011 to December 2011 were reviewed. Diagnosis was confirmed from the historyand clinical findings. Management, complications and outcome were noted.*

RESULTS:A total 120 patients of OP poisoning admitted in the ICU requiring mechanical ventilation were included in the study.Majority of them i.e. 84(70%) were males.Most of the patients (60.8%)were within the age limit of 30 years. Majority of patients (97.5%) hadsuicidal attempt. In 97.5% patients, ingestion was the route of exposure.Mean ICU stay was5.9 days while 35(29.16%) patients developed secondary complications.Overall mortalityrate was 10%.

CONCLUSION:Mortality in OP poisoning is contributed by various factors.Early diagnosis and treatment can significantly improve the outcome.

Introduction

Organophosphorus [OP] compounds have been frequently used as pesticides in agriculture fields. This wide spread use has increased the incidence of intentional or accidental OP poisoning cases thus accounting for morbidity or mortality.They are common suicidal agents in India(1). Worldwide number of organophosphorus intoxications is estimated to be 3,000,000 per year (2).Majority of deaths occur following deliberate selfpoisoning.(3) Organophosphorus compounds irreversibly inhibit acetylcholinesterase at neuromuscular junction. This causes accumulation of acetylcholine and excitation of acetylcholine receptors leading to disruption of neurotransmission.Current treatment for OP poisoning involves decontamination of skin ,gastric lavage,atropine/glycopyrrolate,oximesin addition to ventilatory support which they may require.(4)These are only partly effective, with mortality rate of over 10% or even higher rates(5).Death occurs acutely due to respiratory failure or cardiovascular collapse and later as a result of peripheral respiratory failure and complications of aspiration and long-term ventilation.SoAcute op poisoning is a medical emergency and it is important to know the nature, severity and outcome of such cases in order to take up appropriate prevention and management techniques. This study was aimed to assess the pattern and outcome of acute organophosphoruspoisoning cases requiring mechanical ventilation in a tertiary care hospital in Karnataka.

Materials and Methods :

A retrospective study was conducted on patients with OP poisoning admitted to our hospital between January 2011 and December 2011.Out of the 265 cases of OP poisoning admitted to our hospital,136 patients required intubation and mechanical ventilation.16 such patients were discharged against medical advice and were excluded from

the study.The data of remaining 120 cases were analysed.

All patients suspected as cases of organophosphorus poisoning were initially brought in to Emergency medicine Department. As per the case file of the patients, the diagnosis was made on the basis of history of exposure,clinicalfindings and low serum pseudocholinesterase (level < 4500 IU) activity.Treatment was started immediately as per the protocol.Clothes were removed and body washed with soap water.Nasogastric tube was passed to decompress the stomach and wash it with normal saline.Initial management of all patients withpralidoxime (PAM) and atropine were done as per the recommended dosage schedule. A starting loading dose of 3-10 mg of atropine was administered depending upon the severity. Once atropinised maintenance dose of 1-3 mg was given every hourly. The target end point of atropinisation was (1) Chest clear on auscultation with no wheeze (2) heart rate >80/min (3) pupil no longer pin point (4) dry axilla, and (5) systolic blood pressure >80 mmHg. PAM was administered with a bolus dose of 2 g over a period of 4 hrs and followed by 1 g every 8-12 hours.Oxygen was started in all patients. Patients with Glasgow Coma Scale (GCS) <8, hypoxia, convulsions and unstable haemodynamics were intubated and mechanically ventilated. All the patients were then shifted to the ICU for further management.Administration of PAM and atropine was continued till the target end point was reached.Atropine was subsequently replaced by glycopyrrolate, the dose of which was gradually decreased. PAM in the dose of 1 g IV infusion every 8-12 hours was continued until fasciculations disappeared or skeletal muscle weakness was relieved.Sedation and analgesia was maintained withmidazolam and morphine as intravenous bolus followed by infusion. Monitoring included ECG, NIBP, SpO₂, temperature and urine output.Basic

laboratory investigations included complete blood picture, bloodsugar,urea,creatinine and electrolytes.Chest X-Ray,12-lead ECG and arterial blood gases were done, when required.

Patients requiring mechanical ventilation were initially put on pressure control mode and gradually weaned off by pressure support (PS) ventilation. Positive end expiratory pressure (PEEP) was added as per the lung characteristics. Patients were extubated using rapid shallow breathing index (RSBI) or spontaneous breathing trial (SBT) as the extubation criteria.

Details regarding demographic data, chemical type, treatment, complications and outcome were collected.

RESULTS

A total of 120 cases were included in the study. The patient characteristics were as detailed in the Table 1..

Table 1 :Demography and mode of poisoning

Characterstics	n (%)
Age	(60.83)
<30 years	36(30.16)
>30 years	
Sex	
Male	84(70)
Female	36(30)
Mode	
Suicidal	117(97.5)
Accidental	3(2.5)
Route	
Ingestion	117(97.5)
Inhalation	3(2.5)

There were five different types of op insecticides involved (Table 2).

Table 2 :Type of poisoning agent

Agent	n (%)
Chlorpyrifos	25(20.83)
Monochrotofos	33(27.5)
Methyl parathion	15(12.5)
Dichlorvos	14(11.6)
Diazinon	5(4.16)
Unknown OP	28(23.33)

The number of ventilator days varied from few hours to more than two weeks as per Table 3.

Table 3: Number of Ventilator days

Number of ventilator days	n (%)
< 3 days	25(20.86)
3 – 7 days	66(55)
8– 14 days	21(17.5)
>14 days	8(6.66)

About 35 patients (29.16 %) developed complications during their ICU stay. 12 of these patients died. 9 patients had pneumonia and 5 of them died. 3 out of 4 patients who were complicated with ARDS added to the mortality. All the 4 patients who developed MODS eventually died. Thus the overall mortality rate was 10%. (Table 4)

Table 4: Complications and mortality during ICU stay

Complications	Number of patients n(%)	Mortality n(%)
Pneumonia	9(7.5)	5(41.66)
Intermediate syndrome	16(13.33)	0(0)
ARDS	4((3.33)	3(25)
MODS	4(3.33)	4(33.33)
Delayed polyneuropathy	2(1.66)	0(0)
Total	35(29.16)	12(10)

DISCUSSION

As per our study it was found that majority(60.83%) of the patients were aged <30 years. These observations correlated with the results of Srinivas,etal.(6) as per which two-thirds of cases were less than 30 years of age.

The male to female ratio in this study was 2.3:1. Similar male predominance (1.5:1) was observed in a study done by Ahmed et al(7) However, the male to female ratio given by Ather et al(8) is 1:1 and shaik(9) et al is 1:5.

97.5 % of the patients in our study ingested the poison for suicidal attempt and only 2.5 % patients had accidental inhalation. In a study done by murat and muhammed (10) 68% patients were suicide attempts and 32% were accidental exposure. 93.6% of the patients were poisoned through the gastrointestinal route ,2.1% patient had inhalational poisoning and 4.2% patients had intravenous injection for suicidal purposes.

There were five different types of op insecticides involved (Table 2). The type of op compound could not be known in 28 patients but the diagnosis was confirmed by clinical signs and low pseudocholinesterase levels. Monochrotofos (27.5%) and chlorpyrifos (25%) accounted for most of the op poisoning cases in our study. In the study by Rajeev et al (12) Methyl parathion (50%) was the culprit in majority of the patients followed by Fenithrothion(25%).

The duration of the ICU stay was 5.2 ± 3.0 days in a study by Murat and Muhammed(10). Ahmed et al (9) reported a mean duration of 4.83 ± 3.41 days of ventilator days in their study. The average duration of mechanical ventilation in our study was 5.9 days which was more when compared

to the above mentioned studies. The prolonged duration of ICU stay in our study was due to the fact that all the patients were mechanically ventilated and some of them developed secondary complications as mentioned in Table 4. Duration of ICU stay was 8.6 (range 3-15) days in mechanically ventilated cases in a study by Aziza, et al.(11). Intermediate syndrome is a state of muscle paralysis that occurs after recovery from cholinergic crisis but before the expected onset of the delayed polyneuropathy, and probably results from post-synaptic neuromuscular junction dysfunction (13). The incidence of intermediate syndrome in our study was 13.3%. Reported frequency of intermediate syndrome varies from 8% to 49%.(14,15)

Jamal et al (16) found neuropathy and sensory motor distal axonopathy especially distal paresis in lower limb in 1.5% patients ingesting large doses of organophosphates. In our study 2 patients developed Delayed polyneuropathy requiring long term mechanical ventilation for more than 2 weeks (15 and 21 days). But both the patients were weaned from ventilator without any further complications.

The incidence of pneumonia in our study was 7.5%. It can be because of aspiration of gastric contents due to absent gag reflex or ventilator associated pneumonia. 5 of the 9 patients with pneumonia died (mortality of 41.6 %).

The overall mortality rate in our study was 10%. Reported mortality following OP insecticide poisoning varies between 4% and 30%.(17). In a study by Safdar, et al(18), 21.4% of patients on ventilator expired while Aziza(11), et al reported 8% mortality in patients who received mechanical ventilatory support.

Conclusion

OP insecticide poisoning is a life threatening condition that needs rapid diagnosis and treatment. Since most of the patients present with respiratory failure, early initiation of mechanical ventilation plays a vital role in the treatment of such cases. Emphasis must also be given to good supportive care and monitoring for the prevention and management of acute and delayed complications that occur during the course of stay in ICU.

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