



## Study of Respiratory Failure in Organophosphorus Compound Poisoning with Reference to Ventilatory Support Outcome

## KEYWORDS

RF-Respiratory Failure, IS-Intermediate Syndrome.

**Dr. Sreeramulu Diguvinti**

Associate Professor of Medicine, Govt. General Hospital, Kurnool Medical College, Kurnool, Andhra Pradesh.

**Dr. Pushpalatha Nemali**

Post Graduate in General Medicine, Govt. General Hospital, Kurnool Medical College, Kurnool, Andhra Pradesh.

**Dr. U. Sunitha**

Post Graduate in General Medicine, Govt. General Hospital, Kurnool Medical College, Kurnool, Andhra Pradesh.

**Dr. B. N. Venkata Raghava**

Post Graduate in General Medicine, Govt. General Hospital, Kurnool Medical College, Kurnool, Andhra Pradesh.

**ABSTRACT**

*Organophosphorus (OP) compound poisoning is one of the most common poisonings in India. Globally, OP compound poisoning is a serious occupational hazard accounting to more than 80% of pesticide poisoning related hospitalisation. India being a agricultural country OP pesticide remains the main agent for crop protection and pest control. It is therefore likely to have adverse effects on farmers who accidentally exposed while handling the pesticide. However because of low cost and easy availability it became agent of choice for self poisoning.*

*In developing countries like India the mortality rate can be as high as 25%. High mortality rate could be due to lack of hospital services in vicinity, inadequate transport facility, increased patient to care givers ratio.*

*The fatal issue is often related to delay in diagnosis or an improper management. Management of severe poisoning is difficult requiring intensive care and use of atropine and oxime cholinesterase re activators*

**MATERIALS AND METHODS**

All adult patients with history of organophosphorous compound poisoning who fulfill the inclusion and exclusion criteria admitted to the emergency medical wards of Government General Hospital, Kurnool over a period of one year from November 2013 to October 2014.

- Study involves humans only.
- Type of study –Retro - Prospective study

**INCLUSION CRITERIA**

Adult patients admitted with a history of consumption of organophosphorous compound poisoning during study period with characteristic signs and symptoms were included. Name of the compound was confirmed by the empty bottles brought by the patient's relatives.

**EXCLUSION CRITERIA**

- All patients with poisoning due to other than organophosphorus compound were excluded.
- Patients with poisoning due to mixed poison will be excluded.
- Patients with history of chronic lung disease, COPD, asthma, bronchiectasis, extensive pulmonary tuberculosis and interstitial lung disease.
- Patients with history of chronic cardiac disease.
- Patients with history of neuromuscular disease.

**STUDY METHOD:**

A detailed clinical examination of patients was done. In patients with respiratory failure, oxygen saturation using pulse oximeter, and with arterial blood gas analysis was done. Those who required mechanical ventilator support, were put on mechanical ventilator and monitored until patient

recovered or till death. Data accumulated was analysed with respect to above objectives. A detailed pretested proforma was used to include relevant details of each patient such as name, age, sex, occupation, address, nature of poison and symptoms, and treatment interval and hospitalization treatment received before admission. Routine investigations like complete blood count, blood urea, serum creatinine and serum electrolytes, ECG, chest X-ray were carried out in all patients.

All patients were managed with decontamination procedures including gastric lavage, IV atropine 2-4 mg bolus and repeated every 5-15 minutes until atropinisation, signs of atropinisation taken as the clear chest on auscultation, pupils dilated and drying up of secretions. The atropinisation was maintained for 24-48 hours. Then tapered over days depending upon patients response.

Prolidoxime chloride was given to organophosphorus poisoning patients as 30 mg/kg loading dose bolus over 10-15 minutes immediately after admission and followed by a continuous infusion of 8-10 mg/kg per hour until clinical recovery or 7 days whichever is later. Patients airway and need for mechanical ventilator support were assessed and in needed cases mechanical ventilator support were given. Follow up of cases was done regarding response to treatment, until discharge or death of the patient. The duration of hospital stay and in hospital outcome was documented.

Results are analyzed in relation to various factors 1) Relation between treatment interval and development of respiratory failure 2) Quantity of poisoning and development of respiratory failure 3) Number of days of ventilator support given in respiratory failure and intermediate syndrome

4) Outcome of ventilator support in respiratory failure and intermediate syndrome 5) Total number of patients put on ventilation support and outcome 6) Causes of death in mechanically ventilated patients.

**RESULTS :**

**Table 1: Relation between treatment interval and development of respiratory failure As the treatment interval increases the development of respiratory failure also increases.**

Treatment Interval (hours)	IS		RF		NC		Total	
	No.	%	No.	%	No.	%	No.	%
< 2	0	0	0	0	4	11.76	4	8
2 to 4	1	20	3	27.27	25	73.52	29	58
4 to 6	2	40	4	36.36	5	14.70	11	22
> 6	2	40	4	36.36	0	0	6	12
Total	5	100	11	100	34	100	50	100

NC – No Complications

**Table 2: Quantity of poisoning and development of respiratory failure**

Quantity of poison (ml)	RF		IS	
	No.	%	No.	%
Upto 100ml	1	9.09	0	0
100 -150ml	1	9.09	0	0
150-200ml	2	18.18	1	20
200-250ml	5	45.46	2	40
Not known	2	18.18	2	40
Total	11	100	5	100

As the quantity of poison increases the chance of development of respiratory failure also increases.

**Table 3: Number of days of ventilation support given in RF and IS**

	Average number of ventilatory support given
RF	3.20 days
IS	10.56 days
NC	0

Average number of days of ventilatory support given are in central RF 3.2days and in intermediate syndrome 10.56days

**Table 4: Outcome of ventilatory support In central respiratory failure out of 11 cases, 2 cases expired and in IS out of 5 cases, 2 cases expired**

	Expired	Improved	Total
RF	2	9	11
IS	2	3	5
NC	0	34	34
Total	4	46	

**Table 5: Total number of patient put on ventilatory support and outcome**

Out of 16 cases, who were kept on mechanical ventilation about 4 cases expired. The proportional mortality rate was 25%.

	Expired	Improved	Total
Total number of patients put on ventilation	4	12	16

**Table 6: Cause of death in mechanically ventilated patients**

Causes	NO.of patients	Percentage
Cardiac arrest	2	50
Hypoxic encephalopathy	0	0
Septicemia	1	25
Ventilatory associated pneumonia	0	0
ARDS	1	25
Total	4	100

The cause of death in mechanical ventilated patients are cardiac arrest in 50% of cases, septicemia in 25% of cases and ARDS in 25% of cases.

**DISCUSSION:** Op poisoning is common in India, as ours is an agriculturally based society and as the op compounds are easily available at a cheap rate. Organophosphates are the commonest class of pesticides which have been implicated in case of poisoning. Development of respiratory failure is the commonest complication which has to be taken care with mechanical ventilation in time. These cases have to be monitored carefully. In our study out of 50 cases 11 patients developed respiratory failure and 5 patients developed intermediate syndrome and were given ventilatory support. 4 patients expired in spite of adequate care and monitoring. Factors which influence the development of respiratory failure and mortality are amount of poison and duration between treatment and consumption.

**Table 7: Treatment interval and development of respiratory failure**

Treatment interval(hours)	Present study	Goel et al
<2	0	2%
2-4	27.27%	20%
4-6	36.36%	28.51%
>6	36.36%	53.12%

Respiratory failure is both due to central respiratory failure and intermediate syndrome. Both requires ventilator support. In our study out of 5 patients who developed intermediate syndrome 3 were after 4 days and 2 patients developed within 2 days. Out of 11 patients who developed respiratory failure two were by the time when they presented to hospital, 5 developed on the same day and rest presented in a period of 5 days. The outcome of respiratory failure is worse with intermediate syndrome with 40% mortality when compared to 18.18 with central respiratory failure. Our study reports are comparable with studies of Sungur et al, Cherian M A et al, and Palimar et al.

**Table 8: Development of respiratory failure**

Complications	Present study	Sungur et al.	Cherian M A et al.
Respiratory failure	32%	29.7%	33%

**Table 9: Outcome of ventilatory support**

	Total no. ventilated	Expired	% mortality in present study	Sungur et al.	Palimar et al.
Respiratory failure	11	2	18.18%	50%	-
Intermediate syndrome	5	2	40%	-	22.3%

Figure 1: Out come of ventilatory support

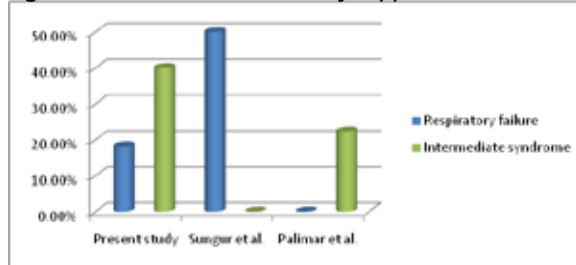


Table 10: Comparing the mortality

Study	Mortality
Present study	8%
Darren M Roberts et al	10%
Tzeng jin din et al	12.71%
Sungur et al	18.7%
Adlakha et al	11%
Goel et al	8.74%
Surjith singh et al	15%

**CONCLUSION:**

Organophosphorus compound poisoning in this area is most commonly as a result of suicidal attempts which is seen frequently in farmers of younger age group of lower socio-economic status from rural areas. Respiratory failure frequently occurs in moderate and severe degree of organophosphorus poisoning. As the quantity of poison and treatment interval increases, the severity of poisoning and development of respiratory failure also increases. As the severity of poisoning is more, the more number of patients develop respiratory failure. Development of respiratory failure in organophosphorus poisoning has poor prognosis. It can be concluded that the type of poisonous agent, the treatment interval, the quantity of poison consumed, the co-morbid conditions of the patients, and the quality of first measures like gastric lavage received at the peripheral health institutions and the quality of medical care available in hospital, (including mechanical ventilators) are the determinant factors for the in-hospital mortality.

**REFERENCE**

1. Palimar V, Saralaya KM, Arun M, Singh B. Profile of methyl parathion poisoning in Manipal, India. *Journal of Indian School of Toxicology* 2005;(12). | 2. Palimar Vikram, Arun M, Saralaya KM. Medico legal update spectrum of organophosphorus poisoning in Manipal. 2005;5(2). | 3. Joseph Goel S, Dutta TK, Das AK. Clinical profile of OP poisoning with special reference to need for ventilator support. *JAPI* 1996; 44(12):951. | 4. Sungur M. Guven M. Intensive care management of organophosphate insecticide poisoning. *Crit Care* 2001 Aug;5(4):211-5. | 5. Eddleston M. Patterns and problems of deliberate self poisoning in the developing world.. *QJM* 2000;93(11):715-31.