

ORIGINAL RESEARCH

A Study on Predictors for Mechanical Ventilation in Organophosphorus Poisoning

M. Arivumani¹, G. Indumathi², P. Sasikumar³, P. Elango^{4*}

¹Assistant Professor, Department of General Medicine, Government Dharmapuri Medical College Hospital, India.

²Assistant Professor, Department of General Medicine, Government Dharmapuri Medical College Hospital, India.

³Associate Professor, Department of General Medicine, Government Krishnagiri Medical College Hospital, India.

^{*4}Associate Professor, Department of General Medicine, Government Krishnagiri Medical College Hospital, India.

Corresponding Author: Dr. P. Elango, Associate Professor, Department of General Medicine, Government Krishnagiri Medical College Hospital, India.

Type of Study: Original Research Paper

Date of Acceptance: 12 December 2022

Date of Publication: January 2023

ABSTRACT

Background: Organophosphate compounds are widely used as pesticides in the agricultural parts of the world. Nearly half of the admissions to emergency with acute poisoning are due to organophosphorus poisoning. Thus the treatment of organophosphorus compounds gained new dimensions with the help of ventilator support. This study predicts the factors which determine the need for Mechanical ventilation. **Aim:** This study aims to find the predictors for Mechanical ventilation in Organophosphates poisoning.

Methods: 100 consecutive patients of organophosphorus poisoning above 18 years of age admitted at Government Dharmapuri Medical college were included in the study during the period of January 2021 to June 2022. It was a observational prospective study. Patients were selected by predetermined inclusion and exclusion criteria and were followed up during inpatient period. Statistical analysis used: SPSS statistical software programme was used for analysis. 'p' value <0.05 was considered as statistically significant.

Results: In this study all of the patients who consumed parathion required ventilatory support. In the present study 78% of patients who consumed monocrotophos required ventilatory support. 77% of patients who presented with low GCS (3-7) required ventilator support in our study .80 percent of patients who had heart rate less than 60 required ventilator support. 91 percent of patients who presented with oxygen saturation of less than 90 % needed ventilator support. 77% of patients who got admitted after 4 hours of consumption required ventilatory support. Mean Cholinesterase level had was one of the important predictor in our study. All patients who required ventilator support had Mean cholinesterase level of 1353u/l.

Conclusion: Parathion, monocrotophos consumption, poor GCS at admission, bradycardia and low oxygen saturation at admission, delayed presentation and low mean cholinesterase level are the important predictors of need for mechanical ventilation in Organophosphorus poisoning.

Keywords: Organophosphorus poisoning, Mechanical ventilation

INTRODUCTION

Since India is a agricultural based country Organophosphate compounds are widely used as pesticides. Most of the admissions to emergency with acute poisoning are due to organophosphorus poisoning. Insecticide form of these compounds are easily available in shops and resulted in gradual increase in suicidal and accidental poisoning. The usage or contact to this compound can be accidental, Suicidal or homicidal. These compounds leads to respiratory failure and it is the leading cause of death. Thus the treatment of organophosphorous compounds gained new dimensions with the help of ventilator support.

MATERIALS AND METHODS

100 consecutive patients of organophosphorus poisoning above 18 years of age admitted at Government Dharmapuri Medical college were included in the study during the period of January 2021 to June 2022.

Study Design: Cross sectional study.

Inclusion Criteria

Patients were selected irrespective of sex, but cases above the age of 18 years were included in the study, Patients with history of consumption of organophosphorus compound presented at Government Dharmapuri Medical College.

Exclusion Criteria

Patients with double poisoning, Patients with chronic lung diseases like, chronic cardiac disease neuromuscular disease. Consent was obtained from all patients before enrolling the study. The study was clearly explained to the patients and relatives in their language. Parameters assessed were 1. confirmed history of organophosphorus poisoning by patients or patient attendants, 2. Consumption to admission interval 3. Examination of containers 4. Typical clinical features like hypersalivation, vomiting, sweating, diarrhoea, GCS, pupil size, fasciculation, neck muscle weakness, pulse rate. 5. Serum cholinesterase levels. Statistical analysis used: SPSS statistical software programme was used for analysis. 'p' value < 0.05 was considered as statistically significant.

RESULT

Out of 100 patients 34 patients needed ventilator support. Though this percentage is quite high because our centre is a tertiary care centre where cases of impending respiratory failure are being referred. In this study all of the patients who consumed parathion required ventilatory support. In the present study 78% of patients who consumed monocrotophos required ventilatory support. 50% percent of patients who consumed chlorpyrifos required ventilator support. Glasgow coma scale at admission was calculated. 77% of patients who presented with low GCS (3-7) required ventilator support in our study. 80 percent of patients who had heart rate less than 60 required ventilator support. 91 percent of patients who presented with oxygen saturation of less than 90 % at admission needed ventilator support. Time of presentation was an important factor. 77% of patients who got admitted after 4 hours of consumption required ventilatory support. Mean Cholinesterase level had was one of the important predictor in our study. All patients who required ventilator support had Mean cholinesterase level of 1353u/l.

DISCUSSION

Organophosphorus compound poisoning is one of the common poison which we come across at our institution requiring intensive care and mechanical ventilatory support. It is easily available to

the patients since our district is manily based on agriculture. Suicide attempt is the leading cause of these poisoning like any other developing countries. 100 patients admitted with organophosphorus poisoning were included in the study and various parameters were assessed. Majority of the patients belong to the age group 21-30 years(45%) which is comparable to S.Singh et al study. In this study 45% were males and 55% were females, which shows there is increased suicidal tendencies in females. This is comparable to the study done by Viswanathan et.al Monocrotophos is the commonest compound consumed in our study (23%) followed by chlorpyrifos which is comparable to Goel et al study⁴.The type of compound also decides the severity and need for ventilatory support. In this study 100% of the patients who consumed parathion required ventilatory support. In the present study 78% of patients who consumed monocrotophos required ventilatory support where 50% of patients who consumed chlorpyrifos required ventilatory support. But studies by Goel et al showed 53% of patients who consumed methyl parathion and 66 % who consumed Dimethoate required ventilatory support. The study of Agarwal S.B showed that ventilator support is more with monocrotophos poisoning which is comparable to present study.

Table: Predictors of Ventilatory Support

Compound	Ventilatory support		P Value	ODDS Ratio
	Required	Not required		
PROPENOPHOS	2	15	0.001	NA
CHLORPYRIFOS	7	14		
ETHION	0	1		
DIMETHOATE	2	14		
PHORATE	0	8		
MALATHION	0	3		
PORPYRIFOS	0	1		
PARATHION	4	0		
MONOCROTOPHOS	18	5		
QUINOLPHOS	1	5		
GCS				
MILD	3	52	<0.001	NA
MODERATE	7	9		
SEVERE	24	7		
HEART RATE				
> 60	13	61	<0.001	32.42
41-60	17	5		
< 40	4	0		
O2 SATURATION				
LESS THAN 90	32	3	< 0.001	75.36
MORE THAN 90	2	63		
TIME INTERVAL				
< 4HRS	11	57	< 0.001	38.46
> 4 HRS	23	9		

CONCLUSION

This study assessed the factors that help in predicting the need for ventilator support in OPC poisoning. 100 patients of OPC poisoning were studied. The following factors were found to be the predictors for the need of ventilator support. Parathion compound need more ventilator support followed by monocrotophos. The patients with Low GCS at admission (3 -7) needed more ventilator support. Patients with Bradycardia and the oxygen saturation at admission less than 90 % was associated with higher need for Mechanical ventilator support. Delayed presentation to hospital (>4 hours) was associated with increased need for ventilator support. Low mean choline esterase level was associated with increased need for ventilator support.

REFERENCES

1. Shetti AN, Bhumika R, Singla B et al. Correlation of serum acetylcholinesterase with the ventilation need, ICU stay and outcome in organophosphorus poisoning – a retrospective study. *Anaesth Pain & Intensive Care*. 2017;21(2):199-203
2. South-East Asia: World Health Organisation; 2009. WHO. Health implications from monocrotophos use: A review of the evidence in India; pp. 1–60.
3. Chethan Kumar RAN, Sahna E. Correlation of Serum Pseudocholinesterase Level and Peradeniya Organophosphorus Poisoning Scale with the Severity and Inhospital Outcome of Acute Organophosphorus Poisoning. *International Journal of Contemporary Medical Research*. 2017, Volume 4, Issue 8, ICV: 77.83.
4. Chowdhary AN, Banerjee S, Brahma A et al. Pesticide poisoning in nonfatal, deliberate selfharm: A public health issue. *Indian J Psychiatr*. 2007;49:117-20.
5. Rajeev H, Arvind MN. “Study of clinical and biochemical parameters in predicting the need for ventilator support in organophosphorus compound poisoning”. *Journal of Evolution of Medical and Dental Sciences* 2013; Vol2, Issue 49, December 09; Page: 9555-9570.
6. Srivastava A, Peshin SS, KaleekalTet al. An epidemiological study of poisoning cases reported to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi. *Hum Exp Toxicol*. 2005;24:279-85.
7. Patil SL, Vasepalli P. Prognostic value of clinical and lab parameters in assessing the severity of organophosphorous compound poisoning *Indian Journal of Basic and Applied Medical Research* 2014;4;77- 91.
8. Goel A et al. Organophosphorus poisoning: Predicting the need for ventilator support. *JAPI* 1998; 46:786-90.
9. Mutalik GS, Wadia RS and Pai VR, Poisoning by diazinon an organophosphorus insecticide. *Jr. of Indian. Medical Association* 1962; 38:67-71.
10. Singh S et al. Spectrum of acute poisoning in adults (10 year experience). *JAPI* 1981; 32:561 – 563.
11. Namba T, Nolte C T, Jackerl J, Gron D. Poisoning due to organophosphate insecticides, acute and chronic manifestations. *American Journal of Medicine*1971; 50:475-492.
12. Bardin PG, Van Eeden SF, Moolman JA. Organophosphate and Carbamate poisoning. *Arch. Intern. Med* 1994; 154:1433-41.
13. Bardin PG, Van Eeden SF, Joubert JR. Intensive care management of acute organophosphate poisoning: a 7 year experience in the Western Cape Town. *S. Afr. Med. J* 1987; 72:593-597.
14. Tsao TC, et al. Respiratory failure of acute organophosphorus and carbamate poisoning. *Chest* 1990; 98:631-636.
15. Dekker M. Organophosphate insecticide poisoning. *Clin Toxicol* 1979; 15:189-191.
16. Clinical profile of patients with organophosphorus poisoning in intensive care unit in a tertiary hospital-*International journal of clinical cases and investigations* 2012; Volume 4(Issue 3) 24:31